

Complaint of North Carolina Environmental Justice Network, Rural Empowerment Association for Community Help, and Waterkeeper Alliance, Inc. under Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d and 40 C.F.R. Part 7

against

North Carolina Department of Environment and Natural Resources

filed with

the United States Environmental Protection Agency

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SUPPORTING EXHIBITS

**VOLUME 1 OF 3
EXHIBITS 1-26**

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Filed: September 3, 2014

Complaint of North Carolina Environmental Justice Network, Rural Empowerment Association for Community Help, and Waterkeeper Alliance, Inc. under Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d and 40 C.F.R. Part 7

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Exhibit 1

Exhibit 1.A

EPA Award of Federal Funds to DENR in Fiscal Year 2014

Unique Federal Award ID	Federal Funding Amount	Award Type	Action Type	Obligation/Action Date	Award Start Date	Award End Date	Program
9549571212	\$0	Project grant	Continuation	10/22/2013	7/1/2012	12/31/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
8360580111	\$0	Project grant	Continuation	11/22/2013	10/1/2011	9/30/2014	Environmental Information Exchange Network Grant Program and Related Assistance
0042961410	\$804,816	Formula grant	New Assistance	11/26/2013	10/1/2013	9/30/2014	State Public Water System Supervision
0040691410	\$552,815	Project grant	New Assistance	12/3/2013	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
8341060114	\$0	Project grant	Continuation	12/6/2013	9/1/2008	9/30/2014	Environmental Information Exchange Network Grant Program and Related Assistance
004060101A	\$806,521	Formula grant	Continuation	12/17/2013	10/1/2009	9/30/2014	Air Pollution Control Program Support
0043561410	\$26,270	Formula grant	New Assistance	12/20/2013	10/1/2013	9/30/2014	State Underground Water Source Protection
9547171118	\$1,603,096	Formula grant	Continuation	12/20/2013	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
9747091410	\$89,000	Formula grant	New Assistance	12/20/2013	10/1/2013	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
0047711116	\$100,000	Formula grant	Continuation	12/20/2013	10/1/2010	9/30/2015	Water Quality Management Planning
9547121111	\$0	Cooperative agreement	Continuation	1/21/2014	1/1/2011	3/31/2014	Regional Wetland Program Development Grants
9544991014	\$0	Cooperative agreement	Continuation	1/23/2014	2/1/2010	6/30/2014	Regional Wetland Program Development Grants
0040691411	\$542,191	Project grant	Continuation	2/7/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
8349270113	\$0	Project grant	Continuation	3/5/2014	3/1/2011	6/30/2015	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
0040691412	\$1,127,887	Project grant	Continuation	3/12/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
9545121015	\$0	Project grant	Continuation	3/21/2014	10/1/2009	9/30/2016	National Estuary Program
0042961411	\$2,337,184	Formula grant	Continuation	4/1/2014	10/1/2013	9/30/2014	State Public Water System Supervision
9548501214	\$0	Project grant	Continuation	4/4/2014	10/1/2011	9/30/2013	Superfund State and Indian Tribe Core Program Cooperative Agreements
004060101B	\$1,430,170	Formula grant	Continuation	4/11/2014	10/1/2009	9/30/2014	Air Pollution Control Program Support
0043561411	\$51,730	Formula grant	Continuation	4/24/2014	10/1/2013	9/30/2014	State Underground Water Source Protection
9541431410	\$750,000	Project grant	New Assistance	5/2/2014	10/1/2013	9/30/2015	Underground Storage Tank Prevention, Detection and Compliance Program
9649680818	\$680,000	Project grant	Continuation	5/7/2014	4/1/2008	3/31/2015	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
9747091411	\$960,000	Formula grant	Continuation	5/15/2014	10/1/2013	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00D1231410	\$2,000,000	Project grant	New Assistance	5/22/2014	10/1/2013	9/30/2015	Leaking Underground Storage Tank Trust Fund Corrective Action Program
9548501411	\$67,868	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State and Indian Tribe Core Program Cooperative Agreements
9548521411	\$236,241	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
9548511411	\$152,190	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
0042961412	\$6,000	Formula grant	Continuation	6/3/2014	10/1/2013	9/30/2014	State Public Water System Supervision
0040691413	\$47,355	Project grant	Continuation	6/19/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
00D1231411	\$254,117	Project grant	Continuation	6/25/2014	10/1/2013	9/30/2015	Leaking Underground Storage Tank Trust Fund Corrective Action Program
9547171119	\$4,340,904	Formula grant	Continuation	6/25/2014	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00D0131211	\$0	Cooperative agreement	Continuation	7/10/2014	1/1/2013	3/31/2016	Regional Wetland Program Development Grants
0047711117	\$156,000	Formula grant	Continuation	7/31/2014	11/5/2010	9/30/2015	Water Quality Management Planning
9544991015	\$0	Cooperative agreement	Continuation	8/6/2014	2/1/2010	6/30/2015	Regional Wetland Program Development Grants
9548841112	\$0	Cooperative agreement	Continuation	8/6/2014	10/1/2011	3/31/2015	Regional Wetland Program Development Grants
00D2071410	\$160,000	Formula grant	New Assistance	8/15/2014	10/1/2014	9/30/2016	Water Pollution Control State, Interstate, and Tribal Program Support
Total Funding Dispersed in FY1	\$19,282,355	This data was recorded from usaspending.gov on August 27, 2014. Fiscal Year 2014 begins on October 1, 2013 and extends through September 30, 2014.					
New Assistance	\$4,382,901						
Continuation	\$14,899,454						

Exhibit 1.B

EPA Awards of Federal Funds to DENR Extending into Fiscal Year 2014 and Thereafter

Unique Federal Award ID	Federal Funding Amount	Award Type	Action Type	Obligation/Action Date	Award Start Date	Award End Date	Program
97470909-1-B	\$0	Formula grant	Continuation	9/4/2013	10/1/2008	1/31/2014	Water Pollution Control State, Interstate, and Tribal Program Support
96496808-1-6	\$320,127	Project grant	Continuation	3/29/2013	4/1/2008	3/31/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
96496808-1-7	\$359,873	Project grant	Continuation	6/28/2013	4/1/2008	3/31/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
96450912-1-1	\$0	Project grant	Continuation	9/30/2013	10/1/2011	3/31/2014	Leaking Underground Storage Tank Trust Fund Corrective Action Program
95471211-1-1	\$0	Cooperative agreement	Continuation	1/21/2014	1/1/2011	3/31/2014	Regional Wetland Program Development Grants
00D01312-1-0	\$272,408	Cooperative agreement	New Assistance	8/29/2012	1/1/2013	6/30/2014	Regional Wetland Program Development Grants
00D16413-1-0	\$283,800	Project grant	New Assistance	9/26/2013	7/1/2013	6/30/2014	Beach Monitoring and Notification Program Implementation Grants
95449910-1-4	\$0	Cooperative agreement	Continuation	1/23/2014	2/1/2010	6/30/2014	Regional Wetland Program Development Grants
98433808-1-0	\$27,414,000	Project grant	New Assistance	8/24/2009	7/1/2009	9/13/2014	Capitalization Grants for Drinking Water State Revolving Funds
98433808-1-1	\$0	Formula grant	Continuation	6/13/2013	7/1/2009	9/13/2014	Capitalization Grants for Drinking Water State Revolving Funds
37000111-1-0	\$26,650,000	Project grant	New Assistance	12/13/2011	10/1/2011	9/30/2014	Capitalization Grants for Clean Water State Revolving Funds
95471711-1-3	\$1,045,551	Project grant	Continuation	1/18/2012	10/1/2010	9/30/2014	Water Pollution Control State, Interstate, and Tribal Program Support
95471711-1-4	\$4,797,234	Project grant	Continuation	4/3/2012	10/1/2010	9/30/2014	Water Pollution Control State, Interstate, and Tribal Program Support
37000111-1-1	\$0	Formula grant	Continuation	5/18/2012	10/1/2011	9/30/2014	Capitalization Grants for Clean Water State Revolving Funds
95471711-1-5	\$297,615	Project grant	Continuation	6/22/2012	10/1/2010	9/30/2014	Water Pollution Control State, Interstate, and Tribal Program Support
95493912-1-0	\$0	Formula grant	New Assistance	8/15/2012	1/6/2012	9/30/2014	Water Pollution Control State, Interstate, and Tribal Program Support
95494011-1-0	\$173,200	Formula grant	New Assistance	8/15/2012	1/6/2012	9/30/2014	Water Pollution Control State, Interstate, and Tribal Program Support
83492701-1-1	\$0	Project grant	Continuation	1/10/2013	3/1/2011	9/30/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
00406010-1-8	\$1,339,535	Formula grant	Continuation	1/23/2013	10/1/2009	9/30/2014	Air Pollution Control Program Support
00477111-1-4	\$100,000	Formula grant	Continuation	2/19/2013	10/1/2010	9/30/2014	Water Quality Management Planning
95488411-1-1	\$0	Cooperative agreement	Continuation	6/4/2013	10/1/2011	9/30/2014	Regional Wetland Program Development Grants
96488511-1-1	\$0	Cooperative agreement	Continuation	6/4/2013	10/1/2011	9/30/2014	Regional Wetland Program Development Grants
00406010-1-9	\$1,134,169	Formula grant	Continuation	7/10/2013	10/1/2009	9/30/2014	Air Pollution Control Program Support
00477111-1-5	\$143,000	Formula grant	Continuation	7/24/2013	10/1/2010	9/30/2014	Water Quality Management Planning
83492701-1-2	\$108,875	Project grant	Continuation	8/14/2013	3/1/2011	9/30/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
00D00712-1-1	\$131,358	Formula grant	Continuation	8/15/2013	10/1/2012	9/30/2014	State Clean Diesel Grant Program
95451210-1-4	\$512,000	Project grant	Continuation	8/27/2013	10/1/2009	9/30/2014	National Estuary Program
00D12313-1-0	\$1,922,000	Project grant	New Assistance	9/5/2013	10/1/2012	9/30/2014	Leaking Underground Storage Tank Trust Fund Corrective Action Program
98497213-1-0	\$85,000	Project grant	New Assistance	9/9/2013	10/1/2013	9/30/2014	Pollution Prevention Grants Program
00D01912-1-1	\$762,099	Project grant	Continuation	9/24/2013	10/1/2012	9/30/2014	State and Tribal Response Program Grants
83605801-1-1	\$0	Project grant	Continuation	11/22/2013	10/1/2011	9/30/2014	Environmental Information Exchange Network Grant Program and Related Assistance
00429614-1-0	\$804,816	Formula grant	New Assistance	11/26/2013	10/1/2013	9/30/2014	State Public Water System Supervision
00406914-1-0	\$552,815	Project grant	New Assistance	12/3/2013	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
83410601-1-4	\$0	Project grant	Continuation	12/6/2013	9/1/2008	9/30/2014	Environmental Information Exchange Network Grant Program and Related Assistance
00406010-1-A	\$806,521	Formula grant	Continuation	12/17/2013	10/1/2009	9/30/2014	Air Pollution Control Program Support
00435614-1-0	\$26,270	Formula grant	New Assistance	12/20/2013	10/1/2013	9/30/2014	State Underground Water Source Protection
00406914-1-1	\$542,191	Project grant	Continuation	2/7/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
00406914-1-2	\$1,127,887	Project grant	Continuation	3/12/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
00429614-1-1	\$2,337,184	Formula grant	Continuation	4/1/2014	10/1/2013	9/30/2014	State Public Water System Supervision
00406010-1-B	\$1,430,170	Formula grant	Continuation	4/11/2014	10/1/2009	9/30/2014	Air Pollution Control Program Support
00435614-1-1	\$51,730	Formula grant	Continuation	4/24/2014	10/1/2013	9/30/2014	State Underground Water Source Protection
00429614-1-2	\$6,000	Formula grant	Continuation	6/3/2014	10/1/2013	9/30/2014	State Public Water System Supervision
00406914-1-3	\$47,355	Project grant	Continuation	6/19/2014	10/1/2013	9/30/2014	Hazardous Waste Management State Program Support
99465710-1-0	\$4,491,600	Project grant	Continuation	8/17/2010	10/1/2009	12/31/2014	Nonpoint Source Implementation Grants
99465710-1-1	\$257,471	Project grant	Continuation	9/30/2011	10/1/2009	12/31/2014	Nonpoint Source Implementation Grants
37000112-1-0	\$25,507,000	Formula grant	New Assistance	2/6/2013	8/1/2012	12/31/2014	Capitalization Grants for Clean Water State Revolving Funds

Exhibit 1.B

EPA Awards of Federal Funds to DENR Extending into Fiscal Year 2014 and Thereafter

Unique Federal Award ID	Federal Funding Amount	Award Type	Action Type	Obligation/Action Date	Award Start Date	Award End Date	Program
95495712-12	\$0	Project grant	Continuation	10/22/2013	7/1/2012	12/31/2014	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
96496808-18	\$680,000	Project grant	Continuation	5/7/2014	4/1/2008	3/31/2015	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
95488411-12	\$0	Cooperative agreement	Continuation	8/6/2014	10/1/2011	3/31/2015	Regional Wetland Program Development Grants
83492701-13	\$0	Project grant	Continuation	3/5/2014	3/1/2011	6/30/2015	Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act
95449910-15	\$0	Cooperative agreement	Continuation	8/6/2014	2/1/2010	6/30/2015	Regional Wetland Program Development Grants
98433809-10	\$27,414,000	Project grant	Continuation	9/28/2010	7/1/2010	9/13/2015	Capitalization Grants for Drinking Water State Revolving Funds
98433809-11	\$0	Formula grant	Continuation	6/13/2013	7/1/2010	9/13/2015	Capitalization Grants for Drinking Water State Revolving Funds
00D01512-0	\$258,651	Cooperative agreement	New Assistance	8/24/2012	10/1/2012	9/30/2015	Regional Wetland Program Development Grants
00D04112-0	\$259,444	Formula grant	New Assistance	8/30/2012	10/1/2012	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00D04213-0	\$0	Formula grant	New Assistance	8/30/2012	10/1/2012	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
95471711-16	\$3,242,610	Formula grant	Continuation	12/18/2012	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
95471711-17	\$2,577,290	Formula grant	Continuation	7/16/2013	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00D04112-1	\$65,856	Formula grant	Continuation	7/29/2013	10/1/2012	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
95414308-14	\$945,000	Project grant	Continuation	8/21/2013	7/1/2008	9/30/2015	Underground Storage Tank Prevention, Detection and Compliance Program
95485414-10	\$24,750	Project grant	New Assistance	9/26/2013	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
95485014-10	\$82,949	Project grant	New Assistance	9/27/2013	10/1/2013	9/30/2015	Superfund State and Indian Tribe Core Program Cooperative Agreements
95485114-10	\$186,009	Project grant	New Assistance	9/27/2013	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
95485214-10	\$288,739	Project grant	New Assistance	9/30/2013	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
95471711-18	\$1,603,096	Formula grant	Continuation	12/20/2013	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
97470914-10	\$89,000	Formula grant	New Assistance	12/20/2013	10/1/2013	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00477111-16	\$100,000	Formula grant	Continuation	12/20/2013	10/1/2010	9/30/2015	Water Quality Management Planning
95414314-10	\$750,000	Project grant	New Assistance	5/2/2014	10/1/2013	9/30/2015	Underground Storage Tank Prevention, Detection and Compliance Program
97470914-11	\$960,000	Formula grant	Continuation	5/15/2014	10/1/2013	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00D12314-0	\$2,000,000	Project grant	New Assistance	5/22/2014	10/1/2013	9/30/2015	Leaking Underground Storage Tank Trust Fund Corrective Action Program
95485014-11	\$67,868	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State and Indian Tribe Core Program Cooperative Agreements
95485114-11	\$152,190	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
95485214-11	\$236,241	Project grant	Continuation	5/27/2014	10/1/2013	9/30/2015	Superfund State, Political Subdivision, and Indian Tribe Site Specific Cooperative Agreements
00D12314-1	\$254,117	Project grant	Continuation	6/25/2014	10/1/2013	9/30/2015	Leaking Underground Storage Tank Trust Fund Corrective Action Program
95471711-19	\$4,340,904	Formula grant	Continuation	6/25/2014	10/1/2010	9/30/2015	Water Pollution Control State, Interstate, and Tribal Program Support
00477111-17	\$156,000	Formula grant	Continuation	7/31/2014	11/5/2010	9/30/2015	Water Quality Management Planning
99465711-10	\$3,902,000	Project grant	New Assistance	9/8/2011	10/1/2010	12/31/2015	Nonpoint Source Implementation Grants
37000113-0	\$24,096,000	Formula grant	New Assistance	9/11/2013	8/1/2013	12/31/2015	Capitalization Grants for Clean Water State Revolving Funds
00D01312-1	\$0	Cooperative agreement	Continuation	7/10/2014	1/1/2013	3/31/2016	Regional Wetland Program Development Grants
98433810-10	\$35,593,000	Project grant	New Assistance	9/8/2011	7/1/2011	9/30/2016	Capitalization Grants for Drinking Water State Revolving Funds
97455902-14	\$132,000	Project grant	Continuation	9/29/2011	7/1/2001	9/30/2016	Congressionally Mandated Projects
95451210-15	\$0	Project grant	Continuation	3/21/2014	10/1/2009	9/30/2016	National Estuary Program
00D20714-0	\$160,000	Formula grant	New Assistance	8/15/2014	10/1/2014	9/30/2016	Water Pollution Control State, Interstate, and Tribal Program Support
99465712-10	\$3,645,000	Formula grant	New Assistance	9/25/2012	10/1/2011	12/31/2016	Nonpoint Source Implementation Grants
98433811-10	\$24,698,000	Project grant	New Assistance	5/29/2012	7/1/2012	9/30/2017	Capitalization Grants for Drinking Water State Revolving Funds
98433811-11	\$3,367,346	Formula grant	Continuation	12/26/2012	7/1/2012	9/30/2017	Capitalization Grants for Drinking Water State Revolving Funds
99465713-10	\$3,455,000	Formula grant	New Assistance	9/24/2013	10/1/2012	9/30/2017	Nonpoint Source Implementation Grants
98433813-10	\$22,084,000	Formula grant	New Assistance	8/20/2013	7/1/2013	9/30/2018	Capitalization Grants for Drinking Water State Revolving Funds
98433812-10	\$17,467,080	Formula grant	New Assistance	9/11/2013	7/1/2013	9/30/2018	Capitalization Grants for Drinking Water State Revolving Funds

Exhibit 2



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF EPIDEMIOLOGY F 919.966.2089
McGAVRAN-GREENBERG HALL
CAMPUS BOX 7435
CHAPEL HILL, NC 27599-7435

December 6, 2013

Via Email

Christine Lawson
NC Division of Water Resources
Animal Feeding Operations Unit
1636 Mail Service Center
Raleigh, North Carolina 27699-1636
christine.lawson@ncdenr.gov

Re: General Permit AWG100000

Dear Ms. Lawson:

North Carolina's general permits for animal waste management systems at industrial swine operations fail to protect public health and the environment. As noted below, there is a large body of evidence documenting the negative health impacts of industrial swine operations, also known as concentrated animal feeding operations (CAFOs).¹ These negative consequences result from the use of lagoons and spray fields to manage animal waste, non-therapeutic use of antibiotics in swine production, the location of confinements and animal waste in flood plains, and the disproportionate burden of CAFO pollutants on communities that are particularly susceptible due to presence of other environmental exposures and inadequate access to medical services. North Carolina communities rely on the Department of Environment and Natural Resources to protect their air, water, and health, and this protection should apply equally regardless of race and wealth. NC DENR currently fails to meet this responsibility and will continue to fail unless future permits are altered to reduce off-site pollution and increase transparency about animal production activities, and regulations are strictly enforced.

I. Negative Health Impacts of Swine CAFOs

Swine CAFOs with liquid waste management systems release numerous air pollutants including particulate matter, endotoxin (a respiratory irritant and allergen that comes from bacteria), ammonia, hydrogen sulfide (a toxic gas that comes from decomposing feces), and other malodorous chemicals. The air pollutants come from barns that house hundreds or thousands of pigs, from open fecal waste pits, and from fields where the waste is spread. Several decades' worth of research shows that, due to exposures inside these facilities, CAFO workers suffer a range of health problems.² More recent research indicates that neighbors of swine CAFOs experience numerous symptoms similar to those seen among workers,

¹ Rather than the strict federal definition we use the term "CAFO" to refer to large livestock operations that house animals in confinement.

² D. Cole, L. Todd, and S. Wing, "Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects," *Environ Health Perspect* 108, no. 8 (2000).

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including irritation of the eyes, nose and throat, respiratory symptoms, reduced lung function, and asthma-related symptoms. Swine CAFO neighbors also suffer from negative mood states and reduced quality of life. We summarize this research here, emphasizing studies conducted in North Carolina.

In 2000, researchers published a study showing that neighbors of an eastern North Carolina swine CAFO reported more episodes of headache, runny nose, sore throat, coughing, diarrhea, and burning eyes than residents of comparison areas with a dairy and no CAFO. Swine CAFO neighbors also reported more frequent episodes when they could not open their windows or go outside their homes compared to residents of the comparison areas.³

In 2006, researchers published a study showing that students at North Carolina public middle schools located within three miles of swine CAFOs had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further from swine CAFOs. Children attending middle schools where school staff reported that livestock odor was present inside the school twice or more per month had a 23% higher prevalence of wheezing symptoms compared to children who attended schools where no livestock odor was reported.⁴ Particles and gases released from swine CAFO liquid waste storage and land application can produce these impacts, which have also been observed in other states.

More recently, investigators set up monitors to measure levels of air pollutants (airborne particles, endotoxin and hydrogen sulfide) outside the homes of eastern North Carolina residents who lived within 1.5 miles of one or more swine CAFOs. While the pollutants were being measured, community members reported twice daily about their mood and symptoms of illness. They also measured their lung function and blood pressure, and they reported the strength of the swine odor that they smelled inside and outside of their homes.

The study demonstrated that concentrations of CAFO pollutants recorded by the air monitors were correlated with neighbors' reports of swine odor.⁵ This finding clearly shows that swine CAFO pollutants travel into neighboring communities where they are inhaled by residents. When swine odor was stronger, participants more often reported that their daily life activities were interrupted and that they felt stressed, gloomy, angry, and unable to concentrate. Higher levels of hydrogen sulfide and semi-volatile particles were associated with reports of feeling stressed or annoyed and nervous or anxious.⁶ Swine CAFO neighbors report that they have lost some of the most treasured parts of their rural way of life, that family and community gatherings are no longer possible, that they can no longer use their private wells as a source for drinking water, and that their properties have depreciated in value.⁷

³ S. Wing and S. Wolf, "Intensive Livestock Operations, Health, and Quality of Life among Eastern North Carolina Residents," *Environ Health Perspect* 108, no. 3 (2000).

⁴ M. C. Mirabelli et al., "Asthma Symptoms among Adolescents Who Attend Public Schools That Are Located near Confined Swine Feeding Operations," *Pediatrics* 118, no. 1 (2006).

⁵ S. Wing et al., "Air Pollution and Odor in Communities near Industrial Swine Operations," *Environ Health Perspect* 116, no. 10 (2008).

⁶ R. A. Horton et al., "Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations," *Am J Public Health* 99 Suppl 3(2009).

⁷ M. Tajik et al., "Impact of Odor from Industrial Hog Operations on Daily Living Activities," *New Solut* 18, no. 2 (2008).

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In the same study, higher levels of hydrogen sulfide were associated with reports of irritation of the eyes and nose, and with runny nose and difficulty breathing. Particle pollution was associated with reports of poor appetite, burning eyes, nasal irritation, wheezing, difficulty breathing, and decreases in lung function. Higher levels of endotoxin were associated with nausea, chest tightness, and sore throat.⁸

Swine CAFO odors and hydrogen sulfide concentrations in these communities were also associated with neighbors' blood pressure levels.⁹ Elevated blood pressure is a well-recognized cause of stroke and heart disease, and the area of eastern North Carolina with the highest density of swine CAFOs is part of a region known as the "stroke belt." Residents of this region, who already suffer excess hypertension-related disease, should not be exposed to pollutants from swine CAFOs that further raise their blood pressures. Additionally, treatment of high blood pressure is a financial burden to patients as well as to private and public insurance systems.

Results from these studies represent average responses among study participants. Some people are more sensitive to environmental exposures than others. Overall, however, the studies provide solid evidence, consistent with findings from worker studies and studies in other regions, that air pollutants from swine CAFOs negatively impact health and quality of life.

In addition to studies of swine CAFO air pollution conducted in our state, a growing body of evidence from other states and countries shows that swine, poultry, and cattle CAFOs contaminate air and water and negatively impact the health and quality of life in neighboring communities.¹⁰ Furthermore, hundreds of CAFOs in eastern North Carolina are located in areas subject to flooding that can transport liquid wastes into local communities,¹¹ and runoff can convey fecal pollution and associated pathogens to surface and ground water supplies and soils.¹² It is just a matter of time before another flood causes massive loss of liquid waste from the thousands of fecal waste lagoons that are in our state's flood plains.

Another concern is the widespread use of antibiotics in CAFOs. Research shows that the use of antibiotics in CAFOs has contributed to the emergence of antibiotic resistant bacteria that can cause dangerous, difficult-to-treat human infections.¹³ Airborne bacteria, including antibiotic resistant strains, have been connected to CAFO air emissions,¹⁴ and antibiotic resistant bacteria are associated with animal vectors

⁸ L. Schinasi et al., "Air Pollution, Lung Function, and Physical Symptoms in Communities near Concentrated Swine Feeding Operations," *Epidemiology* 22, no. 2 (2011).

⁹ S. Wing et al., "Air pollution from industrial swine operations and blood pressure of neighboring residents. *Environmental Health Perspectives*. 121:92-96, (2013).

¹⁰ K. Radon et al., "Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents," *Epidemiology* 18, no. 3 (2007); P. J. Villeneuve et al., "Intensive Hog Farming Operations and Self-Reported Health among Nearby Rural Residents in Ottawa, Canada," *BMC Public Health* 9(2009); P. S. Thorne, "Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards--Searching for Solutions," *Environ Health Perspect* 115, no. 2 (2007).

¹¹ Wing et al., "The potential impact of flooding on confined animal feeding operations in eastern North Carolina," *Environ Health Perspect* 110, no. 4 (2002).

¹² Casteel et al., "Fecal contamination of agricultural soils before and after hurricane-associated flooding in North Carolina," *J Environ Sci Health A Tox Hazard Subst Environ Eng* 41, no. 2 (2006).

¹³ E. K. Silbergeld et al., "One Reservoir: Redefining the Community Origins of Antimicrobial-Resistant Infections," *Med Clin North Am* 92, no. 6 (2008). E. K. Silbergeld, J. P. Graham, and L. B. Price, "Industrial Food Animal Production, Antimicrobial Resistance, and Human Health," *Annu. Rev. Public Health* 29, no. 15 (2008).

¹⁴ J. Schulz et al., "Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant *Staphylococcus aureus*," *Appl Environ Microbiol* 78(16), 5666-5671 (2012). C. F.

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near CAFOs, including flies,¹⁵ rodents,¹⁶ and migratory geese that land on North Carolina's swine waste lagoons.¹⁷ A recent medical records study from Pennsylvania shows that people living near swine waste application sites have elevated hospitalization for infections with methicillin resistant *Staphylococcus aureus* (MRSA).¹⁸ North Carolina swine and poultry CAFO workers carry strains of *Staphylococcus aureus* that are associated with livestock in general, and swine in particular,¹⁹ that could be spread by liquid waste.

II. North Carolina's Swine CAFOs Overburden Low-Income Communities of Color

Research based on a review of state and federal records shows that North Carolina's swine CAFOs are disproportionately located in low-income communities of color.²⁰ Low-income people of color are more susceptible to CAFO pollution because of older housing, less access to air conditioning, increased exposures to other environmental and occupational hazards, higher prevalence of medical conditions that can be exacerbated by exposure to CAFO pollution, and inadequate access to medical services. The disproportionate burden of swine CAFOs in low-income communities of color represents an environmental injustice. Industrial swine production creates profits for out-of-state corporations and provides cheap pork for consumers at the expense of the health and dignity of eastern North Carolina residents who bear the brunt of the local pollution and health impacts. Additionally, the large numbers of CAFOs make these communities unattractive for economic development that would bring clean industries and good jobs.

The problem is not farming, rather it is the industrial production of animals in concentrations that produce massive quantities of waste and pollutants. These practices would never be tolerated in wealthy communities. In North Carolina, CAFO pollution is permitted by the Department of Environment and Natural Resources. The top ten swine-producing counties in the United States are all in eastern North Carolina; the health and environmental impacts of swine production in our state are not simply due to pollution from individual facilities, but result from the density of these operations. Sadly, our regulatory system has forsaken rural residents by allowing the destruction of their health and quality of life.

Green et al., "Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations," *J. Occup & Environ Hygiene*, 3:9-15, 2006. S. G. Gibbs, et al., "Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation," *Environ Health Perspect*, 114:1032-1037, 2006.

¹⁵ A. M. Rule et al., "Food animal transport: A potential source of community exposures to health hazards from industrial farming (CAFOs)," *J Infect & Pub Health*, 1:33-39, 2008.

¹⁶ A. Van de Giessen, et al., "Occurrence of methicillin-resistant *Staphylococcus aureus* in rats living on pig farms," *Preventive Veterinary Medicine*, 91(2):270-273, 2009.

¹⁷ D. Cole et al., "Free-living Canada Geese and Antimicrobial Resistance," *Emerging Infectious Diseases*, 11:935-938, 2005.

¹⁸ JA Casey et al., "High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant *Staphylococcus aureus* Infection in Pennsylvania," *JAMA Internal Medicine*, September 16, 2013.

¹⁹ JL Rinsky et al., "Livestock-associated methicillin and multidrug resistant *Staphylococcus aureus* is present among industrial, not antibiotic-free livestock operation workers in North Carolina," *PLoS ONE*, 8(7): e67641, 2013. doi:10.1371/journal.pone.0067641.

²⁰ S. Wing, D. Cole, and G. Grant, "Environmental Injustice in North Carolina's Hog Industry," *Environ Health Perspect* 108, no. 3 (2000).

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III. DENR Should Provide Records Needed to Document Environmental and Health Impacts

The ability of scientists to document health and environmental impacts of CAFO pollutants, and the ability of the public to become aware of the economic, social and health costs of the current system, is hampered by inadequate public availability of records. We request that DENR compile electronic records of information that permittees are required to collect and make them publicly available. These include:

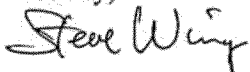
- The waste level in each lagoon (freeboard levels) (III.2(a))
- Precipitation events, including rain levels (III.3)
- Soil fertility (III.4)
- The amount of nitrogen, phosphorus, zinc, and copper in the waste (III.5) as well as arsenic
- Dates of irrigation and land application events, quantities of liquid applied on each day, and other information about land application including hydraulic loading rates, nutrient loading rates, and cropping information, as well as information as to whether solids were removed and information about how those solids were disposed on site, or offsite (if applicable) (III.6)
- Waste transfers between structures on site that are not typically operated in a series (III.7)
- Monthly stocking records (these records are given to DENR, III.8)

In particular we request that DENR obtain each permittee's daily record of the quantities and locations of animal waste applied to land. We also request that DENR make public the boundaries of each field where swine waste is applied to land and detailed information about all pharmaceuticals and other additives in each permittee's swine feed. This information is important for advancing the scientific understanding of environmental and health impacts of land-application of manure and it is critical to the public's right-to-know about environmental pollutants and their costs to neighboring communities and the general public.

IV. Conclusion

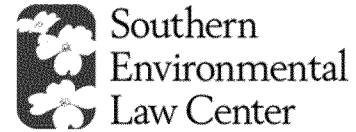
The body of research documenting the damage that industrial swine production causes to human and environmental health continues to grow, and these burdens disproportionately impact communities of color and low income communities. More information about swine CAFOs should be publicly available to allow scientists and concerned citizens to monitor potential impacts. We urge you to modify CAFO permits to set a date in the near future after which the following will be prohibited: 1) the management of swine waste using lagoons and spray fields, 2) the non-therapeutic use of antibiotics in livestock production, and 3) the location of animal confinements and animal waste storage in flood plains. These changes are the minimum required to preserve the health and well-being of rural residents near swine operations.

Sincerely,



Steve Wing, Ginger T. Guidry, Sarah Hatcher and Jessica Rinsky
UNC-CH School of Public Health

Exhibit 3



December 6, 2013

Via Email

Christine Lawson
 NC Division of Water Resources
 Animal Feeding Operations Unit
 1636 Mail Service Center
 Raleigh, North Carolina 27699-1636
christine.lawson@ncdenr.gov

Re: Renewal of North Carolina State General Permits to Control Animal Waste, AWG100000 (Swine Waste Management System General Permit), AWG200000 (Cattle Waste Management System General Permit), AWG300000 (Poultry Waste Management System)

Dear Ms. Lawson:

On behalf of the Catawba Riverkeeper Foundation, Cape Fear River Watch, Neuse Riverkeeper Foundation, North Carolina Environmental Justice Network, Pamlico Tar River Foundation, Waterkeepers Carolina, Western North Carolina Alliance, Winyah Rivers Foundation, and Yadkin Riverkeeper, Inc., the undersigned would like to thank you for the opportunity to comment on the State General Permits for swine, cattle, and poultry waste management systems, AWG100000, AWG200000, and AWG300000, respectively.

Waste from animal facilities operating under these permits has long been a major concern for the citizens of North Carolina and particularly for the communities of color and low income residents in the eastern part of the state that are routinely subject to pollution from these facilities. North Carolina permits more than two thousand five hundred animal facilities with the capacity to raise more than 10 million swine, cattle, and poultry in confinement under its general permit program.¹ These facilities generate a staggering amount of waste that pollutes North Carolina's surface water, groundwater and air, and injures neighboring communities. North Carolina's general permitting program for animal waste management systems should protect environment and these communities from these facilities. Yet, the

¹ See NCDENR, Aquifer Protection, Animal Feeding Operations: Permits, List of Permitted Animal Facilities, <http://portal.ncdenr.org/web/wq/aps/afo/perm> (last visited Dec. 6, 2013). This estimate does not include facilities with individual permits, those authorized under North Carolina's National Pollutant Discharge Elimination System general permit program, or the countless dry-litter poultry facilities that the state deems permitted by regulation.

conditions in these permits are inadequate. On a daily basis, these facilities expose the citizens of North Carolina to harmful pollution.

The proposed drafts of the general permits will not improve these conditions. But for minor technical amendments, the program that the Department of Environment and Natural Resources ("DENR") and the Division of Water Resources ("DWR") is proposing is largely the same as its predecessors. As experience has shown, the general permitting program does not fully protect the state's air, water, or citizens from pollution from animal facilities. Nonetheless, DENR has proposed the same deficient program as the one that came before it. Just as troubling, the recent consolidation of state agencies with province over animal facilities, budget cuts, and the drastic reduction in the number of inspectors threaten to undermine DENR's ability to oversee the general permit program. The citizens of North Carolina need stronger permit conditions with greater accountability.

DENR and DWR have a responsibility to the public to do more to protect the environment and human health from pollution from industrial animal facilities than simply re-propose the same deficient general permits. These comments discuss areas where the general permits could be strengthened. However, no small change to the permitting program will protect North Carolina's environment and its citizens from the pollution generated at industrial animal facilities. In fact, federal civil rights law demands that DENR overhaul the permitting program. Under Title VI of the Civil Rights Act of 1964, DENR has an obligation to ensure that its programs or activities do not have an unjustified disparate impact on the basis of race, color, or national origin. Section II of these comments focuses on DENR's failure to live up to this mandate in permitting swine facilities given clear and longstanding evidence of their impact on communities of color. Research shows that the pollution from these facilities, which in North Carolina are primarily located in communities of color, is a hazard to human health and the environment. Thus, DENR's failure to require robust waste management technologies as a condition of the permit disproportionately impacts communities of color and the program must be redrawn to avoid this result.

In addition to revamping the general permit program for swine, cattle, and wet poultry facilities, DENR also should bring dry litter facilities under the general permitting program. These facilities impact water quality and neighboring communities, yet to date have been allowed to exist, essentially unregulated, with "permits" granted by operation of law. DENR must ensure that no animal facility is allowed to pollute North Carolina's water and air to the detriment of its citizens, including dry litter poultry facilities.

For all of these reasons, DENR must use this opportunity to take a hard look at how animal facilities are polluting the environment and affecting public health, and improve upon the way that waste is controlled at these operations. As currently proposed, the general permits are inadequate to protect North Carolina's communities and its resources.

I. THE PERMITTING PROGRAM'S FAILURE TO PROTECT THE ENVIRONMENT

With the proposed general permits, DENR has not come close to requiring Permittees to develop a "non discharge system to prevent the discharge of pollutants to surface waters and wetlands."² Instead, as DENR is aware, industrial animal facilities operating under these permits are discharging significant nutrient and bacteria loads to watersheds across North Carolina.³

For example, nonpoint source pollution from agriculture, including industrial animal operations, is a significant source of stream degradation in the Tar Pamlico River Basin.³ An estimated 10,000,000 chickens and 96 permitted swine facilities housing over 369,000 hogs located in the Tar Pamlico Basin contribute to this degradation.⁴

The story is the same in the Neuse River Basin. There nutrient and bacteria discharges from intensive livestock facilities have caused widespread water quality impairments.⁵ According the Final Neuse River Plan which was approved by the Environmental Management Commission in July of 2009:

The land application of waste (*wet and dry*) is contributing to runoff of nutrients to the nutrient sensitive waters of the Neuse as well as from contaminated groundwater. Many of the facilities and land application fields are in an area of the coastal plain where the groundwater table is high which requires ditching or tile drain in order to allow for crop harvesting and waste application. *These are direct conveyances for the highly nutrient laden water to reach surface waters. These operations are having a significant negative impact on the Neuse River water quality.*⁶

Similarly, a section of the French Broad River that is widely used for recreation and fishing is impaired for bacteria pollution given the presence of animal facilities. Extensive sampling undertaken by the French Broad Riverkeeper from August 2012 through December 2013 show significant amounts of E. coli pollution entering the river system from the dairy facilities along this important stretch of river.

Independent researchers have confirmed that animal operations are discharging waste and bacteria into the state's waters. For example, a recent study reported that the Cape Fear and White Oak New River Basins are severely impaired by nutrients and bacteria resulting

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² Condition 1.1.

³ DWR, DENR, Tar Pamlico River Basinwide Water Quality Management Plan 7.1. (2010), available at <http://portal.ncdenr.org/web/wq/ps/bpu/basin/tarpamlico/2010>.

⁴ *Id.* §§ 7.3 & 7.4.

⁵ DWR, DENR, Final Neuse River Basinwide Water Quality Plan, Ch. 17 (2009), available at <http://portal.ncdenr.org/web/wq/ps/bpu/basin/neuse/2009>.

⁶ *Id.* § 17.1.4 at 360 (emphasis added).

from industrial livestock facility discharges.⁷ Additionally, unprecedented toxic algal blooms in 2009 and 2012 on the Cape Fear River have been at least partially attributed to nearby livestock production throughout the Cape Fear Basin.⁸ Citizens working with researchers also have documented and shared evidence of contamination with DENR regarding on going contamination in the Cape Fear River Basin due to the industrial hog operations.⁹

While the general permit program leaves substantial room for improvement, it clearly achieves greater protection of human health and the environment than a policy of total deregulation. As discussed below in Section IV, dry litter poultry facilities within the state are deemed permitted by regulation, a designation that leaves them with a permit in name only. Because they do not apply for coverage under the general permit, the state does not have a clear record of the number or location of these facilities. All the same, widespread pollution from dry litter facilities is well documented. In the Catawba River Basin, for example, DENR estimates that the shift from cattle facilities to poultry has affected water quality.¹⁰ Many of the poultry facilities are located in the headwaters of the basin, leading to uncontrolled influxes of sediment into water bodies that are "usually very sensitive to the impacts of sedimentation," including High Quality Water, outstanding resource waters, and Trout Waters.¹¹ Nutrient pollution is a problem that increasingly plagues the Catawba River basin, and elevated bacterial levels continue to cause concern.¹²

Poultry pollution is also a problem in the Yadkin-Pee Dee River Basin, where more than 12 million chickens are raised at industrial livestock operations in Wilkes County alone.¹³ Discharges of bacteria and nutrients from these facilities are virtually unregulated, and are contributing to water quality degradation.¹⁴ Most of poultry facilities are further concentrated in the High Rock Lake watershed, which is listed as an impaired waterbody under the Clean

⁷ See Michael A. Mallin and Lawrence B. Cahoon, UNC-Wilmington, *Industrialized Animal Production: A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems*, 24(5) Population and Environment (May 2003).

⁸ See Justin D. Issacs et al., UNC-Wilmington Center for Marine Science, *Microcystins and Two New Micropeptin Cyanopeptides Produced by Unprecedented Microcystis aeruginosa Blooms in North Carolina's Cape Fear River*, 31 Harmful Algae 82 (2013).

⁹ May 30, 2011 email communication between D. Baron, Rural Empowerment Association for Community Help and C. McNutt, Division of Water Quality, containing water quality sampling results in the Maple Branch watershed showing positive test results for fecal waste, high nitrate levels, E. coli, enterococci, and multidrug resistant Staphylococcus.

¹⁰ DWR, DENR, Catawba River Basinwide Water Quality Plan at 105.6 (NC-DWQ-2010), available at <http://portal.ncdenr.org/web/wq/ps/bpu/basin/catawba/2010>.

¹¹ *Id.*

¹² For example, fifteen out of 32 ambient monitoring stations ("AMS") in the basin recorded fecal coliform bacteria levels above a geometric mean of 200 colonies/100 ml or 400 colonies/100 ml in 20% of AMS samples taken between 2004 and 2008. *Id.*

¹³ Yadkin Riverkeeper, Pure Farms, Pure Water, <https://yadkinriverkeeper.org/issues/pure-farms-pure-water?page=1>.

¹⁴ *Id.*

Water Act's Section 303(d) list. The High Rock Lake Watershed is considered the most threatened section of the Yadkin-Pee Dee River Basin, primarily due to high levels of nutrients, chlorophyll and turbidity, and dissolved oxygen violations.¹⁵

The examples above highlight that the general permit program is not living up to the no discharge promise. Thus, rather than simply reissuing the same permits offered since the program was enacted, DENR must use the renewal period as an opportunity to assess whether facilities are complying with the permits and come up with alternative measures to control the pollution that DENR itself knows is coming from these facilities.

II. NORTH CAROLINA'S PROPOSED GENERAL PERMIT FOR SWINE WASTE MANAGEMENT SYSTEMS SHOULD BE MODIFIED TO COME INTO COMPLIANCE WITH TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

North Carolina's proposed general permit for swine waste management system illegally overburdens communities of color. Under Title VI of the Civil Rights Act of 1964, "[n]o person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."¹⁶ DENR receives federal financial assistance, and thus it is prohibited from operating in any way that disproportionately impacts individuals on the basis of race.¹⁷ DENR's decision to reissue the general permit program for swine waste management systems, and DENR's imminent decisions to issue certificates of coverage allowing individual facilities to operate under the program, are actions that together disproportionately impact individuals on the basis of race. As currently proposed, North Carolina's general permit for swine waste management systems does not protect communities living near swine facilities.

¹⁵ DWR, NCDENR, Yadkin-Pee Dee River Basinwide Water Quality Plan (2008), available at <http://portal.ncdenr.org/web/wq/ps/bpu/basin/yadkinpeedee/2008>.

¹⁶ 42 U.S.C. § 2000d.

¹⁷ The term "program" means "all of the operations of . . . a department, agency, special purpose district, or other instrumentality of a State or of a local government . . . any part of which is extended Federal financial assistance." 42 U.S.C. § 2000d-4a(1)(A). DENR, a department of the State of North Carolina, receives federal financial assistance. For example, in September 2013, the United States Environmental Protection Agency awarded a \$24 million grant to DENR under the Clean Water State Revolving Fund. See USASpending.gov, Prime Award Spending Data, <http://usaspending.gov/advanced%20search> (enter "37000113" into the labeled "Federal Award Identifier"; then click "SEARCH") (last visited Dec. 4, 2013). Thus, all of DENR's operations constitute a program that cannot be carried out in a way that disproportionately impacts individuals on the basis of race. See *Ass'n of Mex. Am. Educ. v. California*, 195 F.3d 465, 474-75 (9th Cir. 1999) ("[T]he definition of 'program or activity' provided by Congress means that if any part of a listed entity receives federal funds, the entire entity is covered by Title VI."), *rev'd in part on other grounds*, 231 F.3d 572 (9th Cir. 2000) (en banc); see also 40 C.F.R. § 7.35(b) ("A recipient shall not use criteria or methods of administering its program or activity which have the effect of subjecting individuals to discrimination because of their race, color, national origin, or sex, or have the effect of defeating or substantially impairing accomplishment of the objectives of the program or activity with respect to individuals of a particular race, color, national origin, or sex.").

Indeed, despite the conditions in the general permit that seek to control pollution, facilities operating under the general permit pollute North Carolina's air and water and wreak havoc on the health and welfare of surrounding communities. Under the current system, swine facilities are disproportionately concentrated in communities of color. Thus, reissuing essentially the same permit program, and authorizing many of the same polluting facilities to operate under it, will adversely and disproportionately impact communities on the basis of race in violation of Title VI. DENR has no compelling justification for this disproportionate adverse impact. To remedy the Title VI violation, DENR must assess the racial and ethnic impact of the permitting program and adopt measures that protect communities from pollution from the swine facilities.

A. Industrial Swine Facilities Adversely Impact Neighboring Communities

Research has shown that industrial swine facilities expose neighboring communities to pollutants that make people sick and greatly reduce their quality of life.¹⁸ The following sections describe a few of the many ways in which the two thousand plus swine facilities that operate under the general permit¹⁹ injure nearby communities.

1. Surface and Ground Water Pollution from Swine Facilities Adversely Impacts Neighboring Communities

Swine facilities contribute to water contamination that threatens the environment and human health. Every year, confined farm animals in the United States generate approximately 500 million tons of manure, with farms that meet the legal definition of a concentrated animal feeding operation under federal law contributing over half of this pollution.²⁰ Most swine facilities in North Carolina funnel the animal waste from the confinement houses to open air pits, called lagoons, where the waste is stored before it is applied to fields as fertilizer. Years of experience demonstrate that the lagoon and sprayfield system can pollute nearby waters and communities in many ways, one of the most dramatic of which is through lagoon breaches and spills. For example, after Hurricane Floyd, many of the lagoons in North Carolina swelled with

¹⁸See, e.g., Steve Wing & Susanne Wolf, *Intensive Livestock Operations, Health, and Quality of Life Among Eastern North Carolina Residents*, 108 *Env'tl. Health Perspectives* 233, 233 (2000) ("Residents in the vicinity of the hog operation reported increased occurrences of headaches, runny nose, sore throat, excessive coughing, diarrhea, and burning eyes as compared to residents of the community with no intensive livestock operations."); Leah Schinasi et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Animal Feeding Operations*, 22 *Epidemiology* 208, 208 (2011).

¹⁹These estimates are drawn from DENR's list of permitted animal operations. See NCDENR, *Aquifer Protection, Animal Feeding Operations: Permits, List of Permitted Animal Facilities*, http://portal.ncdenr.org/c/document_library/get_file?uuid=2daaeac018cc61442c1b33b186190ca5a7d5&groupId=38364 (downloadable spreadsheet).

²⁰National Conference of State Legislatures, *Concentrated Animal Feeding Operations*, [http://www.ncsl.org/research/agriculture and rural development/concentrated animal feeding operations.aspx](http://www.ncsl.org/research/agriculture%20and%20rural%20development/concentrated%20animal%20feeding%20operations.aspx) (last visited Dec. 5, 2013) ("In 2003, the U.S. Environmental Protection Agency (EPA) projected that the nation's 257,000 animal feeding operations annually produced more than 500 million tons of manure. EPA estimated that CAFOs accounted for more than half of this amount.").

additional water and dumped waste into North Carolina's creeks, rivers, and streams.²¹ Even without the aid of an intense storm, lagoons have overflowed, polluting nearby waters and communities.²² Waste spilled from overflowing lagoons has been linked to outbreaks from harmful pathogens, such as salmonella and E. coli,²³ has led to major fresh water fish kills, and has contributed to toxic algae outbreaks.²⁴

Visible spills are not the only way that swine waste lagoons threaten the environment and communities.²⁵ Many of the lagoons in North Carolina were built in the 1990s, before it was well understood that lagoons must be lined with plastic and compacted clay to reduce the

21 Steve Wing, et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 *Env'tl. Health Perspectives* 387, 387 (2002), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240801/pdf/ehp01101000387.pdf> (describing how the 15-20 inches of rain dropped by Hurricane Floyd turned eastern North Carolina into a fecal flood zone). The flooding following Hurricane Floyd was not an isolated incident. *Id.* ("In 1996, 22 fecal waste pits were reported to have been ruptured or inundated following flooding from Hurricane Fran, and one major spill was reported following Hurricane Bonnie in 1998.")

22 Ryke Longest, *Development in Environmental Law Applicable to Agricultural Business in North Carolina*, in 7 *Nat'l Env'tl. Enforcement J.*, Nat'l Assoc. of Attorneys Gen' 1*6 (2005), available at <http://ssrn.com/abstract=2217601> (relating that in 1995, a swine lagoon at Oceanview Farms in Onslow County gushed out 25 million gallons of wastewater into local streams and ditches when one of its dike walls burst).

23 Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 *Farm Community Health* 11, 13 (2010).

24 Joann Burkholder et al., *Impacts of Waste from CAFOs on Water Quality*, 115 *Env'tl. Health Perspectives* 308, 309 (2007), available at <http://dx.doi.org/10.1289/ehp.8839>.

25 Recent drought conditions within the state have reduced the number of lagoon spills. However, this does not suggest that industry has cleaned up, but rather than conditions changed temporarily due to weather. In addition, with the drop in the number of inspectors across the state, lagoon failures and conditions leading to lagoon failures are less likely to be detected in a timely way as in the past.

potential for the stored waste to leach into groundwater.²⁶ These lagoons are grandfathered into the current system, and are allowed to operate with the same outdated technologies that threaten ground water and wells, unless and until DENR takes action to require the lagoons to do better.²⁷ Studies completed in eastern North Carolina have shown that swine facilities are contaminating shallow ground water in part because of these lagoons.²⁸ Leakage from hog lagoons in North Carolina poses a real threat to human health; a study completed in 2000 found that "[a]lmost half of all hog CAFOs are located in block groups where >85% of households have well water."²⁹ When the well water is contaminated, communities near these facilities are forced to choose between finding another water source (often at considerable expense), such as

²⁶According to one expert, "lagoons were expected to develop a seal at the liquid/soil interface that would impede seepage." R.L. Huffman, *Seepage Evaluation of Older Swine Lagoons in North Carolina*, 47(5) Am. Soc'y of Agric. Eng'rs 1507 (2004); see also Danny McCook, Discussion of Background Considerations in the Development of Appendix 10D to the Agricultural Waste Management Field Handbook 1 (2001), available at http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_024192.pdf ("Prior to about 1990, NRCS engineers commonly assumed that the accumulation of manure solids and the bacterial action resulting from a sludge interface would effectively reduce seepage to an acceptable level."). These assumptions about the effectiveness of natural sealing turned out to be inaccurate or overstated. See *id.* ("However, research demonstrated that manure sealing was not as complete as formerly believed."); see also Nat'l Res. Conservation Agency, Agricultural Waste Management System Component Design Part 651: Agricultural Waste Management Field Handbook 10D 1 (rev. 1, 2008), available at <ftp.wcc.nrcs.usda.gov/wntsc/AWM/handbook/ch10.pdf> ("A rule of thumb supported by research is that manure sealing is not effective unless soils have at least 15 percent clay content for monogastric animal waste."). The General Assembly has, in recognition of this improved scientific awareness, generally prohibited the construction of new lagoons. See N.C. Gen. Stat. § 143-215.10(b). Should such construction nevertheless be permitted, DENR would require that any new lagoon "be designed and constructed with synthetic liners to eliminate seepage." 15A NCAC § 2T.1307(b)(1)(A).

²⁷A lagoon for which a permit was issued prior to 2007 "may continue to operate under that permit, including any renewal [thereof]." See 2007 N.C. Sess. Laws 523 § 1(b). Grandfathering is also accomplished via DENR regulations. See 15A NCAC § 2T.1304(a)(1) (requiring animal waste management systems to meet "all applicable state statutes and rules at the time of development or design") (emphasis added). Where DENR is willing to acknowledge that these lagoons threaten water quality and the environment, it may require facilities to obtain an individual permit, which must remedy that threat. *Id.* § 2T.0111(h)(7) (indicating that DENR can require a facility whose lagoon "has been allowed to deteriorate or leak such that it poses an immediate threat to the environment" to obtain an individual permit).

²⁸M.E. Anderson & M.D. Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. coli in Groundwater on or near Swine Farms in Eastern North Carolina*, 54(3) Water Science & Tech. 211, 217 (2006) ("Overall, the results of this study demonstrated that antibiotic resistant E. coli were present in groundwaters associated with commercial swine farms that have anaerobic lagoons and land application systems for swine waste management."); see also Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121(6) Env'tl. Health Perspectives A182, A186 (2013) ("Even without spills, ammonia and nitrates may seep into groundwater, especially in the coastal plain where the water table is near the surface.").

²⁹Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108(3) Env'tl. Health Perspectives 225, 228 (2000) [Wing, *Environmental Injustice*].

signing up county water lines where available or purchasing bottled water, or exposing themselves to degraded water.

In addition to lagoon leaks and spills, the lagoon and sprayfield system threatens water quality and communities in other ways. For example, waste runs off sprayfields when overapplied or applied on already saturated or frozen ground. Sprayers also apply waste directly into ditches that lead to surface waters. Finally, waste blows into surface waters or neighboring homes when it is sprayed on the fields.³⁰

2. Air Pollution from Swine Facilities Adversely Affects Neighboring Communities

The confinement system authorized under the general permits contributes to air pollution that causes health problems among nearby populations and takes a toll on quality of life. The confinement houses at swine facilities are equipped with industrial fans that circulate air from the outside to cool the animals and bring in clean air. In so doing, the fans also push small particles and gases that are injurious to human health and welfare into the air around the confinement houses. Decomposing waste in lagoons also contributes to air pollution. As the waste sits in the lagoon, it gives off methane and other malodorous or toxic gases, including hydrogen sulfide. In addition, the waste intended for the sprayfields can mist on nearby homes, cars, and laundry left out on the line to dry.³¹

One recent study of the impact of industrial swine operations on adults living in eastern North Carolina found that the odor and chemicals emitted from the operations, including hydrogen sulfide, leads to acute eye irritation, increased incidents of difficulty breathing, and increased wheezing.³² The same study found that industrial hog facilities emit endotoxins, or toxins associated with bacteria, that contribute to increased incidence of sore throat, chest tightness, and nausea among the exposed population.³³ A separate study found that people living near a 6,000-head swine facility in North Carolina suffered elevated rates of respiratory and gastrointestinal problems, mucous membrane irritation, headaches, runny nose, sore throat,

³⁰ For photograph of spraying into ditches, see Exhibits 1 and 2.

³¹ See Nicole, *supra* note 28, at A 183.

³² Schinasi, *supra* note 18, at 208 (measuring pollutants levels and effect on 101 adults living near hog CAFOs in 16 eastern North Carolina communities).

³³ *Id.*

excessive coughing, diarrhea, and burning eyes as compared to residents in the control group that did not live near industrial livestock operations.³⁴

Airborne pollution contributes to myriad health problems. Research also has shown that children and adults living and going to school near swine facilities have greater asthma rates than populations that are not exposed to swine facilities.³⁵ In addition, research has shown the risk of infant mortality linked to respiratory disease increases when pregnant women living near livestock production facilities.³⁶ Airborne pollution from industrial swine facilities also has been shown to reduce healthy immune function, thereby increasing a person's susceptibility to illness.³⁷

The airborne pollutants and the accompanying odor not only harms health, it also has a huge effect on quality of life. People who live near swine facilities often are not able to open their windows, sit outside, or otherwise take full advantage of their property because of the intense and putrid odor associated with the facilities.³⁸ Studies also have shown that those

34. Wing & Wolf, *supra* note 18; see also Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108(8) *Env'tl. Health Perspectives* 685 (2000) (reviewing literature on health effects associated with swine industrial agriculture); Susan Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113(5) *Env'tl. Health Perspectives* 567 (2005) (finding that those exposed to diluted swine air for two 1-hour sessions were more likely to report headaches, eye irritation, and nausea than the control group that was exposed to clean air).

35. Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 118 *Pediatrics* 666 (2006) (finding students aged 12 to 14 who attended North Carolina public schools within 3 miles of industrial swine facilities reported increased asthma related symptoms, more doctor diagnosed asthma, and more asthma related medical visits compared to peers at other schools); James Merchant et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 *Env'tl. Health Perspectives* 350 (2005) (finding children living on swine farms, including large facilities with more than 500 head, experienced increased rates of asthma compared to non exposed children; results more pronounced where swine facilities added antibiotics to feed); Katja Radon et al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*, 18 *Epidemiology* 300 (2007) (surveying nearly 7,000 residents of four German towns with high confined livestock operation densities and concluding that such operations "may contribute to the burden of respiratory disease among their neighbors").

36. Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 *Am. J. of Agric. Econ.* 124, 130 (2009).

37. Rachel Avery et al., *Odor from Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59(2) *Archives of Env'tl. Health* 101 (2004) (finding that swine odor was associated with reduced mucosal immune function among 15 adults living near industrial swine operations in North Carolina).

38. See, e.g., Wing & Wolf, *supra* note 18; see also Steve Wing et al., *Air Pollution and Odor in Communities Near Industrial Swine Operations*, 116(10) *Env'tl. Health Perspectives* 1362 (2008) (study participants living within 1.5 miles of swine factory farm reported altering or ceasing normal daily activities when hog odor was strongest) [Wing, *Air Pollution and Odor*].

living near swine facilities report more tension, more depression, more anger, less vigor, more fatigue, and more confusion than control subjects who are not exposed to industrial animal production.³⁹

3. Swine Facilities Can Spread Antibiotic Resistant Bacteria, Which Threatens Human Health

Swine facilities also risk spreading antibiotic resistant bacteria, which also threatens human health. Many swine facilities use antibiotics not simply to treat disease, but instead to promote growth and to preemptively ward off the threat of disease.⁴⁰ A growing body of research has documented the emergence of antibiotic resistant bacteria linked to the overuse of antibiotics in livestock production. For example, studies across the world, including here in the United States, have found a specific strain of methicillin resistant *Staphylococcus aureus* ("MRSA") in both swine and people who work in the swine industry.⁴¹ These antibiotic resistant bacteria can be transferred from farm animals to humans via airborne particle emitted

³⁹See, e.g., Susan Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 37 *Brain Research Bull.* 369 (1995); Wing, *Air Pollution and Odor*, supra note 38 (finding that when hog odor was the strongest, study participants more frequently reported feeling stressed, gloomy, angry and unable to concentrate).

⁴⁰James MacDonald & William McBride, USDA, *The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks* 32-35 (2009), available at <http://www.ers.usda.gov/ersDownloadHandler.ashx?file=/media/184977/eib43.pdf> (downloadable PDF).

⁴¹Tara C. Smith et al., *Methicillin Resistant Staphylococcus aureus (MRSA) Strain ST398 Is Present in Midwestern U.S. Swine and Swine Workers*, 4 *PLoS One* e4258 (2009); Tara C. Smith et al., *Methicillin Resistant Staphylococcus aureus in Pigs and Farm Workers on Conventional and Antibiotic Free Swine Farms in the USA*, 8 *PLoS One* e63704 (2013); Jessica L. Rinsky et al., *Livestock Associated Methicillin and Multidrug Resistant Staphylococcus aureus Is Present Among Industrial, Not Antibiotic Free Livestock Operation Workers in North Carolina*, 8 *PLoS One* e67641 (2013); Xander W. Huijsdens et al., *Community Acquired MRSA and Pig Farming*, 5 *Annals of Clinical Microbiology & Antimicrobials* 26 (2006) (Netherlands); Ingrid V.F. Van den Broek et al., *Methicillin Resistant Staphylococcus aureus in People Living and Working in Pig Farms*, 137(5) *J. Epidemiol. & Infection* 700 (2009) (Netherlands); Oliver Denis et al., *Methicillin Resistant Staphylococcus aureus ST398 in Swine Farm Personnel, Belgium*, 15(7) *Emerging Infectious Diseases* 1098 (2009) (Belgium); Khanna et al., *Methicillin Resistant Staphylococcus aureus Colonization in Pigs and Pig Farmers*, 128 *J. Veterinary Microbiology* 298 (2008) (Canada).

from the confinement houses.⁴² Antibiotic resistant bacteria associated with industrial livestock production also can be transmitted through water. For example, a recent water quality study found that samples taken near industrial animal facilities were more likely to contain multi-drug resistant bacteria than water sampled elsewhere.⁴³

A recent report by the Center for Disease Control highlights that the growing number of antibiotic resistant bacteria is a significant to human health.⁴⁴ According to the report, each year more at least 2 million people in the United States acquire a serious infection that is resistant to antibiotics, and at least 23,000 people die each year as a result of those infections.⁴⁵ Among those infections, "MRSA infections can be very serious and the number of infections is among the highest of all antibiotic resistant threats."⁴⁶ The report estimates that MRSA infections are declining, but cautions that if infection rates increase, or if the strains become resistant to other antibiotics, then MRSA will become an increasingly urgent threat.⁴⁷

4. Proximity to Swine Facilities Depresses Property Values

Finally, in addition to the health and welfare impacts discussed above, living near a swine facility has negative economic effects. Studies across the country, including in North Carolina, have demonstrated a statistically significant relationship between declining property

42 Amy Chapin et al., *Airborne Multidrug Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 *Envtl. Health Perspectives* 137, 137 (2005) (finding multidrug resistant *Enterococcus*, coagulase negative staphylococci, and viridans group streptococci in the air of an industrial swine operation at levels dangerous to human health); Shawn Gibbs et al., *Airborne Antibiotic Resistant and Nonresistant Bacteria and Fungi Recovered from Two Swine Herd Confined Animal Feeding Operations*, 1 *J. of Occupational and Env'tl. Hygiene* 699 (2004) (finding multidrug resistant bacteria inside and downwind of industrial swine operations at levels previously determined to pose a human health hazard); Julia Barrett, *Airborne Bacteria in CAFOs: Transfer of Resistance from Animals to Humans*, 113 *Env'tl. Health Perspectives*, A 116, A 116-17 (2005) (reviewing literature on cross-species transfer of antibiotic resistant bacteria); Jochen Schulz et al., *Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock Associated Methicillin Resistant Staphylococcus aureus*, 78 *Applied Env'tl. Microbiol.* 5666 (2012) (detecting MRSA 300 feet from a barn where the animals, the air, the workers' plastic boots tested positive for MRSA).

43 Bridgett West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways Near CAFO Farms and Wastewater Treatment Facilities*, 217 *Water Air Soil Pollution* 473 (2011).

44 Centers for Disease Control, U.S. Dep't of Health and Human Servs., *Antibiotic Resistance Threats in the United States, 2013* (2013), available at <http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>.

45 *Id.* at 6.

46 *Id.* at 20.

47 *Id.*

values and proximity to a swine facility.⁴⁸ The research suggests that property values will decline with increasing proximity to a swine facility, and with the increasing number of swine at the facility.⁴⁹

As this body of research shows, swine facilities adversely impact adjacent communities. People who live near swine facilities are exposed to toxic water and air pollution that not only make enjoying time spent at home more difficult, but also threatens mental and physical health and depresses the value of nearby homes.

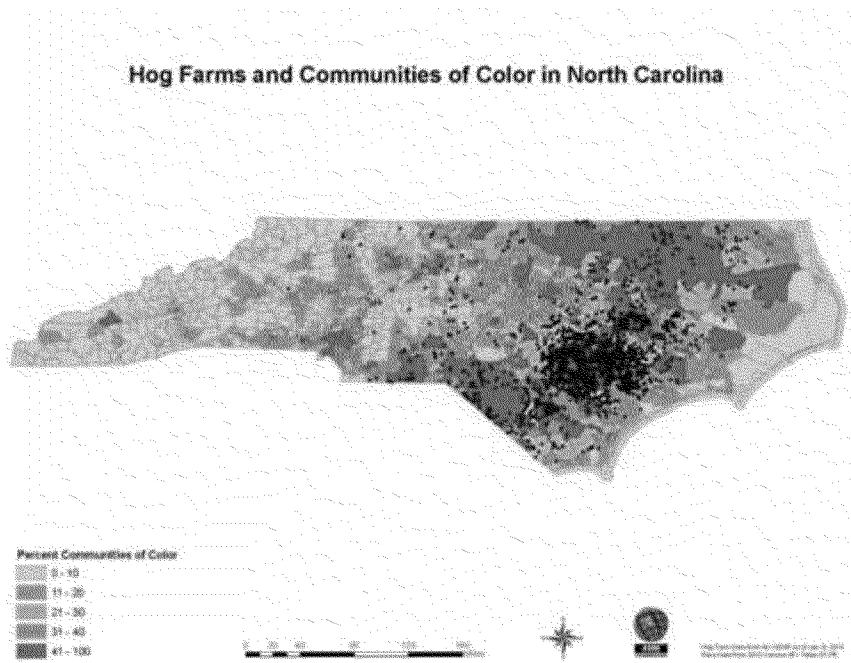
B. African American Communities Disproportionately Bear the Impact of Swine Facilities

In North Carolina, a disproportionate number of African Americans as compared to the general population are adversely affected by swine facilities. Under the current permitting system, swine facilities are concentrated in communities of color, and the number and location of swine facilities is not expected to change significantly with this new permitting cycle.

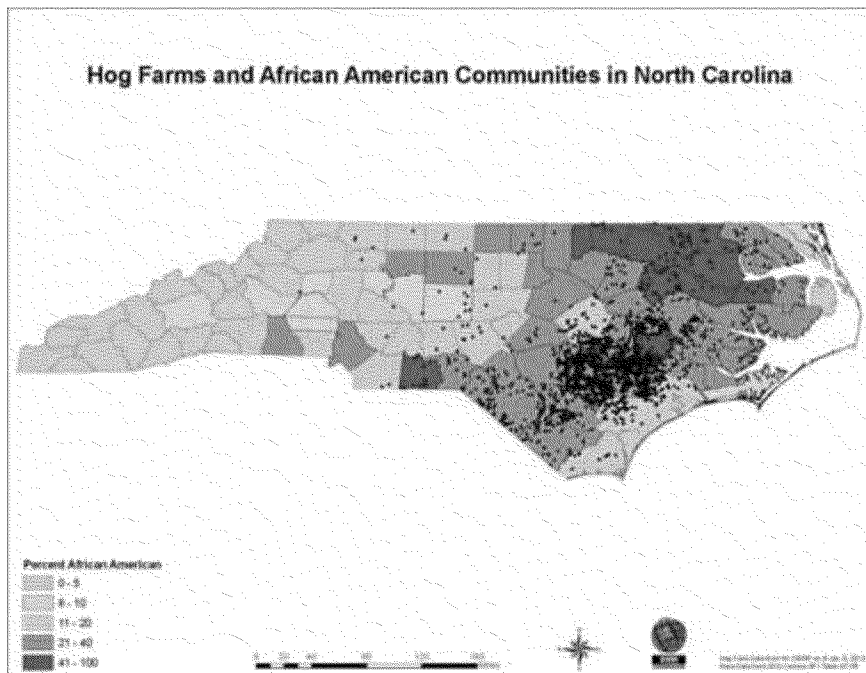
The maps below show the swine facilities permitted under the current program as black dots overlaying a map of the state. The different colors on the map show the population densities, per United State Census data, the first reflecting percentage non white and the second the percentage African American in the population. The first map shows that most of the swine facilities in the state are concentrated in counties in which the non white population is greater than 20 percent, and more often than not, is greater than 40 percent.

⁴⁸Raymond Palmquist et al., *Hog Operations, Environmental Effects, and Residential Property Values*, 73(1) Land Econ. 114 (1997) (studying the relationship between swine factory farms on property values in nine counties in southeastern North Carolina and finding that the effect on price depended on the distance from the factory farm and the number of confined animals in the area); Katherine Milla et al., *Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS Hedonic Model Approach*, 17 URISA J. 1, 27 (2005) (finding that values in Craven County, North Carolina decreased with increasing number of confined hogs and as the distance between the homes and the factory farms decreased); Jungik Kim & Peter Goldsmith, *A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values*, 42(4) Env. & Resource Econ. 509 (2009) (estimating decline in property value on a per hog basis in Craven County, North Carolina); Joseph Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81(44) Land Econ. 530 (2005).

⁴⁹Palmquist et al., *supra* note 48; Milla et al., *supra* note 48.



The second map shows that swine facilities are overwhelmingly located in communities where the African American population is greater than 20 percent.



Thus, if largely the same swine facilities are given certificates of coverage to operate under the proposed general permit, communities of color will continue to disproportionately bear the impact of the swine factory farms.

The swine industry's disproportionate impact on the basis of race has long been known and documented. It is time for the state to pay attention to the problem and bring the permitting program into compliance with the law. For example, a study examining the relationship between race and spatial concentration of swine waste (and thus swine facilities) in eastern North Carolina between 1982 and 1997 found evidence that "minority communities and localities lacking the political capacity to resist are shouldering the bulk of the adverse economic, social, and environmental impacts of the pork industry restructuring."⁵⁰ The study also concluded that in eastern North Carolina, where at the time 95% of North Carolina's swine waste was produced, there was a "strong direct relationship between poverty and concentrated swine waste."⁵¹ A later study found that there were nine times more hog factory farms in areas where there was more poverty and high percentages of non-white people.⁵² Research on school distribution in North Carolina also has shown that swine facilities overburden communities of color. The research has found that schools in lower income areas with a larger non-white population are more likely to be sited near an industrial livestock operation than other schools in the state.⁵³ This research supports the above analysis, further demonstrating that the system of permitting swine facilities in North Carolina disproportionately impacts communities of color.

Strikingly, then, although swine facilities have historically had a disproportionately impact on the basis of race, there is no evidence that DENR took steps to analyze the disparity its permitting program creates or attempted to address the disparity in any way.

C. Less Discriminatory Alternatives to the Proposed General Permit

Rather than perpetuating the current system for permitting swine animal waste management systems, which unduly overburdens communities of color, DENR must consider alternative ways of managing waste at these facilities that would have a less discriminatory impact. One way to lessen the impact that swine facilities have on surrounding communities is to adopt permit conditions that require facilities to improve their waste management systems.

Abandoning the lagoon and sprayfield model would go a long way to prevent swine facilities from polluting the water and air, and injuring nearby communities. As is described

⁵⁰Bob Edwards & Anthony E. Ladd, *Race, Class, Political Capacity and the Spatial Distribution of Swine Waste in North Carolina, 1982-1997*, 9 N.C. Geographer 51 (2001).

⁵¹*Id.*

⁵²Wing, *Environmental Injustice* *supra* note 29, at 225.

⁵³Maria Mirabelli et al., *Race, Poverty, and Potential Exposure of Middle School Students to Air Emissions from Confined Swine Feeding Operations*, 114 *Env'tl. Health Perspectives* 591 (2006) (finding schools in North Carolina with white student population less than 63% and subsidized lunch-eligible population greater than 47% were more likely to be located within 3 miles of a factory farm than were schools with high white or high socioeconomic status populations); Paul Stretesky et al., *Environmental Inequity: An Analysis of Large Scale Hog Operations in 17 States, 1982-1997*, 68 *Rural Sociology* 231 (2003) (finding that between 1982 and 1997, large scale hog operations in North Carolina were more likely to be sited in areas that had a disproportionate number of black residents).

above, the lagoons are prone to overflowing into surface waters and leaking pollutants directly into groundwater and contaminating wells. The lagoons themselves also emit gases as the waste decomposes. Spraying also contributes water quality issues, as waste that is overapplied can run off into surface water, leak into groundwater, and blow into neighboring properties. Short of moving away from the lagoon and sprayfield system, facilities could take other measures to improve upon the lagoons. For example, facilities could retrofit existing lagoons to recover valuable byproducts that can be used as fertilizer, while treating the remaining effluent to generate liquid that can be used to fertilize fields.⁵⁴ Facilities also could install anaerobic digesters that recover methane from the lagoon to generate biogas that can be used to generate electricity and heat, again along with measures to address remaining waste problems.⁵⁵ DENR should consider these options and others in an effort to improve the system that illegally impacts communities of color.

DENR should also consider requiring the facilities to install controls on the confinement houses that filter the air before pushing it up and out. These controls should filter the harmful substances, including fine particles, dust, and gases that take a toll on human health. Such "end-of-pipe" controls could limit the impact these facilities have on neighboring communities. DENR should exercise its authority to reduce harmful air pollution as part of its program to control animal waste. Air pollution is a large byproduct of these animal systems that should be addressed under a comprehensive program to address animal waste. In addition, DENR has the authority to control pollutants that are emitted first into the air that later are washed into waters under laws designed to protect water quality.⁵⁶ Thus, to the extent that the program is implemented under laws designed to protect water quality, DENR still has a responsibility to control pollution that is first emitted in the air and affects water quality. For all of these reasons, DENR should require permitted facilities to meet standards to reduce airborne pollutants.

⁵⁴A recent article on sustainable swine production discusses alternative "end of pipe" technologies that improve upon the current lagoon and sprayfield system, including lagoon retrofits. See Michelle B. Nowlin, *Sustainable Production of Swine: Putting Lipstick on a Pig?*, 37 Vt. L. Rev. 1079, 1116-1127 (2013). One potential is the "Super-Soils" technology, which uses a wastewater treatment system to separate the solids and nutrients to create fertilizer and other value added by-products and treated the water for irrigation and to clean the barns. *Id.* at 1121-23. The Crystal Peak Fertilizer process similarly concentrates and digests the solids in the waste, dries the solids using harvested gases, and uses the cleaned water for irrigation. *Id.* at 1127.

⁵⁵*Id.* at 1123-25 (describing a waste-to-energy project that uses an anaerobic digester that collects gases to feed a microturbine that powers the facility); *id.* at 1128 (describing a project that used a metal scraper, as opposed to a flush system, to move the waste from the facility to an anaerobic digester that converted the waste to energy). Methane recapture and similar programs are insufficient on their own and would need to be accompanied by other provisions to prevent harm to the environment and health. Moreover, these types of measures threaten to further concentrate swine facilities and entrench the current system of raising large numbers of animals in confinement.

⁵⁶*Rose Acre Farms, Inc. v. NC Dep't of Env't. & Natural Resources*, 12 CVS 10, slip op. at 8-9 (Hyde County Sup. Ct. Jan. 7, 2013).

Finally, DENR should modify permit conditions as described in the following section to mitigate the impact of its permitting program.

III. AREAS WHERE DENR SHOULD STRENGTHEN THE GENERAL PERMITS TO PROTECT THE ENVIRONMENT AND HUMAN HEALTH

Many of the conditions in the animal waste management general permit for swine, poultry, and cattle either fail to protect the environment and human health or are not in keeping with best scientific practices. The following sections provide specific comments on conditions in the proposed general permits that should be improved.

A. Condition I.1

DENR must ensure that animal waste management systems do not discharge pollution into waters of the state. The current conditions, however, do not protect against discharges.

For example, the permit currently requires facilities to be "designed, constructed, operated, and maintained to contain all waste plus the runoff from a 25th year, 24th hour rainfall event for the location of the facility." Yet DENR continues to tie its standard for 25th year, 24th hour rainfall events to antiquated rainfall information dated to the 1960s. The permits provide:

25th year, 24th hour rainfall or storm event means the maximum 24th hour precipitation event with a probable recurrence interval of once in 25 years, as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States," May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed therefrom.⁵⁷

This definition fails to provide clear guidance reflecting the fact that the National Oceanic and Atmospheric Administration ("NOAA") has updated its rainfall tables. By continuing to rely primarily on the 1961 authority, without citing any of the subsequent amendments, the permit fails to mandate that facilities must be prepared for more severe weather events, which are now more frequent.⁵⁸ Given that extreme weather events are no longer rare one-offs, the old standard is not as protective against discharge as it may have been in the past. To ensure that Permittees maintain adequate waste storage conditions, and do not unduly discharge to waters of the State, the general permit should ensure that the standard used will reflect current science so that lagoons can store precipitation, while maintaining a buffer to account for the risk of a rare, but powerful storm.

⁵⁷ Condition VII, definition of 25th year, 24th hour rainfall or storm event, emphasis added.

⁵⁸ See, e.g., 2 NOAA Atlas 14, Precipitation Frequency Atlas of the United States: Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia (2006), available at http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume2.pdf.

Similarly, DENR should clarify the last paragraph of Condition I.1, which appears to allow "any discharge [from] or application of waste to a ditch that drains to surface waters or wetlands" where the discharge is controlled by best management practices ("BMPs") designed in accordance with NRCS standards and the BMPs were implemented as designed to prevent a discharge to surface waters or wetlands. If this is the intent of this paragraph, it should be removed. We are unaware of any NRCS standard that prescribes best practices that would allow a Permittee to apply waste to a ditch that drains to surface waters or wetlands, or discharge waste from a ditch that drains to surface waters. Best practices prohibit applying waste to or discharging from ditches that drain to surface waters, and those best practices should be incorporated into this permit. Thus, DENR should simply prohibit any discharge from or application of waste to a ditch that drains to surface waters or wetlands.

If, however, in the last paragraph of Condition I.1, DENR intended to further limit when a Permittee might avail itself of the safe harbor allowing discharges in the event of storm more severe than a 25th year, 24^{hr} storm, DENR should clarify that intent. The last sentence of Condition I.1 states that "[n]othing in this exception shall excuse a discharge to surface waters or wetlands except as may result because of rainfall from a storm event more severe than the 25th year, 24^{hr} storm." If DENR added that last sentence to convey that the only authorized discharges from ditches that drain to surface waters and wetlands are those that **BOTH** are prompted by a storm more severe than the 25th year, 24^{hr} rainfall event **AND** meet the additional conditions in the paragraph, then DENR should reverse the order of the last paragraph, along the following lines:

All discharges to surface waters or wetlands, including discharges resulting from application of waste to a ditch that drains to surface waters or wetlands, are prohibited unless they result from rainfall from a storm event more severe than the 25th year, 24^{hr} storm. Furthermore, discharges resulting from application of waste to a ditch that drains to surface waters or wetlands must meet the following additional conditions: (a) discharges from the ditches are controlled by best management practices (BMPs) designed in accordance with NRCS standards; (b) the BMPs have been submitted to and approved by the Division of Water Resources (Division); (c) the BMPs were implemented as designed to prevent a discharge to surface waters or wetlands; (d) the waste was removed immediately from the ditch upon discovery; and (e) the event was documented and reported in accordance with Condition III.13.

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B. Condition I.3

Proposed Condition I.3 requires the Permittee to "assess and record, on an ongoing basis, the effectiveness of the implementation of the [Certified Animal Waste Management Plan]." DENR should require these assessments to be submitted to DWR quarterly, or at least with the annual certification report required under Condition III.14 (as revised per these comments). DENR should also make these assessments available to the public.⁵⁹

Under the proposed version of Condition I.3, Permittees need not submit an amendment to their Certified Animal Waste Management Plan ("CAWMP") to the Division of Water Resources Regional Office "unless specifically requested by the Division." However, DENR should require Permittees to submit all amendments to the CAWMP to the DWR for approval. The CAWMP is one of the primary tools required under the general permit to ensure that the permitted facilities do not contribute to surface or ground water pollution. Putting aside the question whether the plans achieve their goal, DWR and DENR should be made aware of any and all changes to the CAWMP.

Indeed, the permit defines amendments to include changes to the CAWMP that could affect whether it protects water quality. For example, under the definition of amendment, a Permittee would not need to submit "a change in crops and/or cropping pattern that utilizes 25% or less of the N generated."⁶⁰ DWR and DENR have an obligation to ensure that amid changes, the CAWMP is designed to prevent pollution of surface and ground water, and that the facility is properly covered under the general permit. DWR and DENR cannot ensure proper waste management unless they understand all changes to the plan, including changes in crops or cropping patterns at the land application sites. As currently conceived, the Permittee and the Permittee alone is able to determine whether, with the changes to its crops, it will still be able to apply waste at agronomic rates. DWR and DENR must oversee this process.

C. Condition I.5

Under proposed Condition I.5, DWR may require facilities located in watersheds sensitive to nutrient enrichment to conduct an evaluation of the facility and its CAWMP to determine whether the facility is able to comply with the NRCS nutrient management standard for phosphorus. This condition, as proposed, does not sufficiently protect water quality. DWR should require all facilities in all watersheds, not just sensitive watersheds, to submit to a DWR-completed facility-wide evaluation at least every three years to ensure that the facility is able to comply with the NRCS nutrient management standards for phosphorus. In addition, the general permit should prohibit all facilities, not just those in watersheds sensitive to nutrient enrichment, from applying waste on fields with a "HIGH" phosphorus loss assessment rating at rates that exceed the established crop removal rate for phosphorus. DENR also must require the agronomic application of waste in all instances.

⁵⁹Section III.X, *infra*.

⁶⁰See First Bullet under Definition of Amendment.

D. Condition I.6

Under proposed Condition 1.6, "[i]f prior approval is received from the Director of the Division (Director), facilities that have been issued a COC to operate under this General Permit may add treatment units for the purpose of removing pollutants before the waste is discharged into the lagoons/storage ponds." The general permit does not, but should, define the term "treatment units." DENR should also clarify that nothing in this Condition shall allow Permittees to circumvent the state law barring authorities from "issu[ing] or modify[ing] a permit to authorize the construction, operation, or expansion of an animal waste management system that serves a swine farm that employs an anaerobic lagoon as the primary method of treatment."⁶¹

E. Condition I.7

Under proposed Condition 1.7, "[i]f prior approval is received from the Director, facilities that have been issued a COC to operate under this General Permit may add innovative treatment processes to the systems on a pilot basis in order to determine if the innovative treatment process will improve how the waste is treated and/or managed." The general permit does not, but should, define the term "innovative treatment process." If DENR intends to refer to the sorts of technologies first described in Session Law 1997-458, and clarified in Session Law 1998-188—namely, those which "do[] not employ an anaerobic lagoon," "do[] not employ land application of waste," and are "designed to be the subject of a research project"—it should so state.⁶² DENR should also clarify that nothing in this Condition shall allow Permittees to circumvent the state law barring authorities from "issu[ing] or modify[ing] a permit to authorize the construction, operation, or expansion of an animal waste management system that serves a swine farm that employs an anaerobic lagoon as the primary method of treatment."⁶³

F. Condition I.8

DENR has proposed to renew Condition 1.8 without change. As currently proposed, DENR would require a 100-foot setback from wells, other than monitoring wells, when applying animal waste. A 100-foot setback is the national minimum setback from wells recommended by EPA.⁶⁴ As such, it does not take into account state specific conditions that require further setbacks to protect the integrity of well water.

The number of animal operations in North Carolina along with its unique soil warrants a greater minimum setback distance than the 100 feet currently proposed. North Carolina is the

61 N.C. Gen. Stat. §143-215.10f.

62 1997 S.L. 458-§1.1(b)(7) (H.B. 515) (as modified by 1998 S.L. 188-sec. 2 (H.B. 1480)).

63 N.C. Gen. Stat. §143-215.10f.

64 Office of Wastewater Mgmt., U.S. EPA, Producers' Compliance Guide for CAFOs: Revised Clean Water Act Regulations for Concentrated Animal Feeding Operations (CAFOs) 33 (2003), available at [http://www.epa.gov/rfa/documents/Compliance CAFOs.pdf](http://www.epa.gov/rfa/documents/Compliance%20CAFOs.pdf).

"second-highest swine-producing state in the Nation."⁶⁵ Most of the swine facilities are located in the east portion of the state, "a region that is sensitive because of low lying flood plains and high water tables."⁶⁶ In addition, North Carolina has many different types of soil—from sand and loam to clay—that differ widely in their capacity to absorb animal waste as it is applied to the land.⁶⁷ One study of North Carolina swine waste sprayfields showed that only 62% of nitrogen in applied waste was absorbed by onsite soils.⁶⁸ Of the remaining 38%, 22% was lost to "unintended offsite transport" and 16% remained unaccounted for in onsite soils.⁶⁹ This research suggests that a significant amount of nitrogen that is applied to sprayfields in North Carolina could be transported through the porous land to nearby ground water resources, like wells. The general permit should take into account this research and increase the setbacks from wells.

North Carolina would not be alone in requiring increased setbacks. Other states with comparably high densities of industrial animal operations have rejected the 100-foot minimum in favor of more protective setback distances. Iowa, for example, enforces setback distances of 200 feet from any drinking water well, and 800 feet from high-quality water resources, including those with exceptional recreational and ecological importance, heightened public usefulness due to outstanding physical qualities, or unique scenic value.⁷⁰ Georgia, which shares a partial border with North Carolina, has a minimum of 250 feet from private wells.⁷¹ The minimum setback distance in Illinois is 150 feet.⁷²

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⁶⁵N.C. Water Sci. Center, U.S. Geological Survey, Surface Water Quality and Swine CAFOs, <http://nc.water.usgs.gov/projects/cafo/summary.html> (last modified Mar. 13, 2013).

⁶⁶Wing, *Environmental Injustice* *supra* note 29, at 225 ("In the past, hog production was dispersed throughout the state, but it has become consolidated in the coastal plain region, which concentrates waste and the potential for environmental damage in a region that is sensitive because of low lying flood plains and high water tables.").

⁶⁷As one former state official noted: "Eastern North Carolina's situation is complicated by a crazy quilt of soil types where layers of sand, loam and clay begin and end abruptly." Joby Warrick & Pat Stith, *New Studies Show That Lagoons Are Leaking*, News & Observer, Feb. 19, 1995, <http://www.pulitzer.org/archives/5893>.

⁶⁸Jeffrey T. DeBerardinis, Nitrogen Mass Balance for Spray Fields Fertilized with Liquid Swine Waste 67 (2006) (unpublished M.S. thesis, University of North Carolina at Chapel Hill), *available at* <http://dc.lib.unc.edu/cdm/singleitem/collection/etd/id/262>.

⁶⁹*Id.*

⁷⁰Iowa Dep't of Natural Res., Separation Distances for Land Application of Manure from Open Feedlots & Confinement Feeding Operations, including SAFOs, 1 tbl. 2 (2003), *available at* http://www.iowadnr.gov/portals/idnr/uploads/afo/fs_sepdstb4.pdf. For a description of Iowa's high-quality protected resources, see Iowa Dep't of Natural Res., High-Quality Water Resources: A List for Manure Applicators and Producers Who Need a Construction Permit (2003), *available at* http://www.iowadnr.gov/Portals/idnr/uploads/afo/fs_hqwr2.pdf.

⁷¹Env'tl. Prot. Div., Ga. Dep't of Natural Res., Guidelines for Land Application of Sewage Sludge (Biosolids) at Agronomic Rates (2006), *available at* http://www.gaepd.org/Files_PDF/techguide/wpb/smplasguidelinerev_June2006.pdf.

⁷²35 Ill. Adm. Code 560.203.

Another common practice is for state authorities to modify setback distances for public or community wells, i.e. those serving several households. For example, Wisconsin generally employs the same general 100 foot setback from wells, yet requires a 1,000 foot setback from community wells.⁷³ Georgia requires a 500 foot setback for public or community wells, as compared with the 250 foot setback from private wells.⁷⁴ Another neighboring state, South Carolina requires at least a 200 foot setback from both public and private drinking wells.⁷⁵

North Carolina should follow these states' lead and require greater setbacks across the board. At a minimum, North Carolina should require greater setbacks for community wells and pristine waters. For the foregoing reasons, we suggest that DWQ amend Condition I.8 to:

- ffi Increase the minimum setback for private wells to at least 500 feet.
- ffi Impose a separate setback applicable to public or community wells of at least 1000 feet.
- ffi Impose a separate setback to protect waters that have high recreational use as well as designated high quality waters.⁷⁶

G. Condition II.7

Proposed Condition II.7 allows Permittees to wait for up to 2 days before tilling manure or sludges that have been applied to bare soil, or before an earlier predicted rainfall. DENR should revise this condition to require manure and sludges to be incorporated into the soil within twelve hours of application to bare soil to better protect against runoff or odor. Studies have concluded that "solid livestock manure [should] be incorporated into the soil within 12 hours of broadcasting in order to maximize the nutritional benefits to the soil and minimize odors and possible environmental effects the manure may have."⁷⁷ By incorporating the waste

⁷³ Wis. Adm. Code NR § 243.14(2).9. Wisconsin regulations also provide that "[a]ny water system serving 7 or more single-family homes, 10 or more mobile homes, 10 or more apartment units, 10 or more duplex living units or 10 or more condominium units shall be considered a community water system unless information is provided by the owner indicating that 25-year round residents will not be served." *Id.* § 811.02(16).

⁷⁴ See Ga. Env'tl. Prot. Div. *supra* note 71.

⁷⁵ S.C. Code Ann. Regs. § 61-43-100.100(C)(1)(e), (2)(e), (3)(d) (with respect to swine waste utilization, "[t]he minimum separation distance in feet required between a manure utilization area and a public and private drinking water well is 200 feet.").

⁷⁶ For example, DENR should require greater setbacks from waters classified as "High Quality Waters (HQW)" or "Outstanding Resource Waters (ORW)." See 15A NCAC § 2B.0101(e) (HQW includes, among other categories of water bodies, "waters which are rated as excellent based on biological and physical/chemical characteristics through Division monitoring or special studies;" ORW are "unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses").

⁷⁷ Lawrence Papworth et al., Agtech Ctr., Investigation into Manure Incorporation of Various Tillage Methods (2001), available at [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/eng9949](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/eng9949).

within twelve hours, as opposed to forty eight hours, the general permit would avoid the unnecessary risk of runoff and exposure to odor.

H. Condition II.10

Proposed Condition II.10 requires Permittees to dispose of dead animals "whose numbers exceed normal mortality rates associated with the facility" in accordance with the facility's CAWMP and North Carolina Department of Agriculture and Consumer Service (NCDA & CS) Veterinary Division's statutes and regulations. DENR should ensure that the NCDA & CS Veterinary Division's statutes and regulations protect the environment and, if they do not, DENR should promulgate additional regulations and require additional provisions in the CAWMP that do. Given North Carolina's high water tables, burying animals poses a great risk to water resources and public health, and DENR should ensure its regulations protect against this risk.

DENR also should define "normal mortality rates" for each facility and require Permittees to report all die offs in excess of those rates within 24 hours. In the event of a die off in excess of the defined normal mortality rates, the Permittee should consult with DWR about appropriate burial locations. The Permittee should provide DWR a map of burial sites along with the dates and number of animals buried by species and type. DWR also should require ground water monitoring for each so called "massive burial of animals," which should be defined as any die off in excess of the facility's normal mortality rate.

I. Condition II.12

Proposed Condition II.12 requires Permittees to establish a "protective vegetative cover" for all earthen lagoon/storage pond embankments, berms, pipe runs, and diversions to surface waters or wetlands. The General Permit should specify that the protective vegetative cover must be designed to prevent the berms and embankments from eroding and include criteria as to what is protective.

J. Condition II.17

Proposed Condition II.17 refers to inspections during land application of waste. DENR should remove the provision that allows the Permittee to "assert as an affirmative defense in any enforcement action alleging noncompliance with the requirements imposed in this condition that such noncompliance was due to circumstances beyond the Permittee's control." The permit should not incorporate an open ended affirmative defense to potentially dangerous discharges. At a minimum, DENR should define the circumstances that will be considered "beyond the Permittee's control," such that it does not include preventable accidents or operator error.

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K. Condition II.22

Proposed Condition II.22 prohibits land application of waste during precipitation events. This condition is very important to protecting water quality, but should be strengthened.

Currently, the condition requires land application to cease within four hours of the time that the National Weather Service issues a Hurricane Warning, Tropical Storm Warning, or Flood Watch associated with a tropical system for the county in which the permitted facility is located. This condition could be strengthened by requiring Permittees to cease land application at least twenty-four hours before the National Weather Service predicts, with an 80% certainty, that there will be two inches or more of rainfall in the county in which the permitted facility is located. Further, DENR should prohibit land application for at least twenty-four hours after the land receives two inches or more of precipitation (as gauged by on-site rain gauges, or as recorded by the National Weather Service).

The current four-hour cessation period does not give the waste proper time to incorporate into the land, leaving it exposed to become part of the storm runoff. The recommended twenty-four-hour cessation period would also allow for better management and monitoring for compliance.

L. Condition II.24

Proposed Condition II.24 requires, "[a]ll waste application equipment must be tested and calibrated at least once every two years. The results must be documented on forms provided by, or approved by, the Division." This condition should be amended to require the Permittee to test the equipment more frequently, at least once every six months, and submit the results of the testing to DWR.

M. Condition II.26

Proposed Condition II.26 provides that "[c]rops for which animal waste is land applied must be removed from the land application site and properly managed and utilized unless other management practices are approved in the CAWMP." DENR should define the term "removed" in a way that prohibits the practice of "storing" crops in bales (hay, Bermuda grass, etc.) around the exterior of sprayfields and/or crop fields not used as sprayfields. Especially in times of drought, when the crops are denied other sources of water, the crops might have absorbed a lot of nutrients that could leach back out during the "storing" period.

N. Condition II.27

Proposed Condition II.27, which authorizes Permittees to temporarily lower lagoon levels in certain circumstances, should be revised to state that "an operator may temporarily lower lagoon levels only with the prior approval of the Division." As currently proposed, DWR is not ensuring that the decision to temporarily lower the lagoon will not impair water quality.

Instead, the condition purports to give Permittees authority to lower their lagoons, through excess land application, in anticipation of the hurricane season or in times of drought as long as the Permittee thinks the decision comports with NRCS Standards. In addition to requiring DWR approval before lowering the lagoon, DENR should clarify that nothing in Condition II.27 overrides Condition II.22, which, as proposed, requires land application to cease within four hours of certain storm warnings.

O. Condition III.1

Proposed Condition III.1 states that "lagoons/storage ponds, and other structures should be inspected for evidence of leakage" on at least a monthly basis. This condition fails to suggest—let alone specify—a practical method for facility operators to determine whether a particular lagoon might be leaking. DENR should provide Permittees with guidance as to how to inspect the lagoons, and require more than mere visual inspections.⁷⁸

The best method to conclusively measure the content and direction of seepage plumes would be to require broader installation and utilization of monitoring wells. Absent requiring additional monitoring wells, DENR could require the Permittee to install an evaporation pan to determine lagoon seepage loss.⁷⁹ Alternatively, DENR could require the Permittees to submit to third-party testing for lagoon seepage, as other state agencies have done.⁸⁰ More advanced methods, requiring neither monitoring wells nor significant waste withholding periods, have

78 Obviously, "visual observation," as indicated in the next sentence of Condition III.1, could not even be remotely effective at detecting seepage at the bottom of a seven-foot-deep, sludge-filled lagoon.

79 See also Nat'l Res. Conservation Agency, USDA, Agricultural Waste Management System Component Design Part 651: Agricultural Waste Management Field Handbook 10D 40 (rev. 1, 2009), available at ftp.wcc.nrcs.usda.gov/wntsc/AWM/handbook/ch10.pdf (explaining that one approach to measure lagoon seepage loss "involves installing precise water level monitoring devices and evaporation stations. Seepage losses can be estimated by carefully monitoring the levels in the pond during periods when no waste is introduced into the pond and no rainfall occurs. After estimating the amount of evaporation, and subtracting that from the total decline in the level of the pond, seepage losses can be estimated.").

80 Idaho, for example, passed a 2009 rule stating that "[a]ll existing lagoons shall be seepage tested by an Idaho-licensed professional engineer, an Idaho-licensed professional geologist, or by individuals under their supervision." IDAPA § 58.01.16.493; see also Idaho Dep't of Env'tl. Quality, Guidance for Evaluating Wastewater Lagoon Seepage Rates (2009), available at http://www.deq.idaho.gov/media/516273_lagoon_seepage.pdf (guidelines "provided to assist wastewater lagoon owners and consultants to comply with the seepage test requirements of IDAPA 58.01.16.493"). For seepage test methods approved by other states, see Wis. Adm. Code NR § 208.05(h), Jan R. Hyngstrom et al., Univ. of Neb. Lincoln Extension, Inst. of Agric. and Natural Res., Residential Onsite Wastewater Treatment: Lagoon Design and Construction (2010), available at <http://ianrpubs.unl.edu/live/g1441/build/g1441.pdf> and Or. Dep't of Env'tl. Quality, Guidelines for Estimating Leakage from Existing Sewage Lagoons (1990), available at <http://www.deq.state.or.us/wq/rules/div052/guidelines/estleak.pdf>.

also been proven effective at measuring lagoon seepage.⁸¹ Given the number and concentration of lagoons in North Carolina, it is past time for DENR to catch up with its counterpart agencies by including seepage test procedures in the revised General Permit.

P. Condition III.5

Under Condition III.5, DENR has proposed to require permitted facilities to analyze a representative sample of animal waste as close to the time of application as practical, but at least within 60 days of when the waste is applied (i.e., up to 60 days before, or 60 days after application). DENR requires the waste to be tested for four elements: nitrogen, phosphorus, zinc, and copper.⁸² With this information, DENR ostensibly intends to ensure that the Permittee has information to inform whether and when it is appropriate to apply the waste to fields. Yet allowing the Permittee a four-month window in which to test the waste is far too generous. The characteristics of the waste can change drastically over a four-month period. For example, if waste is sampled in February, while it is accumulating in storage, but not applied until April, warmer seasonal temperatures will have altered the nutrient contents, making the cold weather test results potentially misleading.⁸³ Thus, instead of allowing Permittees a four-month window, DENR instead should require testing of the waste that actually will be applied, before application, so that the Permittee can assess conditions at the facility and plan when to apply the waste based on knowledge of its content.

Q. Condition III.9(f)

Proposed Condition III.9 sets forth the requirements of a discharge notice. In particular, under Condition III.9(f), the Permittee is required to analyze a sample of waste from the source lagoon/storage pond within seventy-two hours of knowledge of the discharge. In addition to requiring the Permittee to analyze a sample from the source lagoon/storage pond, DENR also should require the Permittee to test the water receiving the discharge for the parameters contained in Condition III.9(f). Both samples should be collected within 12 hours of the

⁸¹See, e.g., J.M. Ham & K.A. Baum, *Measuring Seepage from Waste Lagoons and Earthen Basins with an Overnight Water Balance Test*, 52 Am. Soc'y of Agric. and Biological Engineers 835 (2009) (introducing test capable of producing accurate seepage measurements in single overnight performance); J.M. Ham, *Seepage losses from animal waste lagoons: A summary of a four year investigation in Kansas*, 45 Am. Soc'y of Agric. Eng'rs 983 (2002) (summarizing study performed using earlier variation of water balance method).

⁸²In addition to testing the waste for nitrogen, phosphorus, zinc, and copper, DENR should follow advances in microbial source tracking ("MST") and consider requiring Permittees to test for MST markers in future versions of the permits. MST, also referred to as bacterial source tracking, broadly describes a group of methods that can be used to identify the source of fecal waste. Over the last few years, the science has significantly advanced, and there are several promising markers to identify the source of animal waste as well as a number of commercial laboratories that are able to complete the testing. With these markers, DENR and the Permittee will be in a better position to understand whether a discharge from a permitted facility contributed to water quality issues, a goal of Condition III.10.

⁸³See Iowa State Univ. Extension, *How to Sample Manure for Nutrient Analysis* 12 (Nov. 2003), available at <http://www.extension.iastate.edu/publications/pm1558.pdf>.

knowledge that there has been a discharge, not seventy two hours. By seventy two hours after a discharge, the contaminants in the receiving water could be quite dispersed, and the testing will not show the full impact of the discharge.

In addition, DENR should specify best practices for handling the samples. For example, both the sample from the source lagoon/storage pond and the sample from the receiving water should be kept on ice and taken to a certified laboratory within the time frame set forth under best scientific practices, usually within 24 hours.

DENR should also revise this condition to ensure that the Permittee provides the monitoring results to DWR as soon as possible, but at least within 15 days. Thereafter the information should be available to the public.⁸⁴

R. Condition III.11

Proposed Condition III.11 requires the Permittee to maintain a copy of the facility's certificate of coverage, certification forms, lessee and landowner agreements, certified animal waste management plan and copies of all records required under the permit for three years. Rather than requiring the forms to be maintained for three years, the Permittee should be required to maintain this information for five years, the current term of the permit. Information required under the permit—like soil and waste analyses, rain-gauge readings, freeboard levels, irrigation and land application event records, past inspection reports and operational reviews, animal stocking records, records of additional nutrient sources, cropping information, waste application equipment testing and calibration, and records of removal of solids to offsite locations—are important to understanding whether the Permittee has complied with the terms of the general permit and should be issued a new certificate of coverage. At the five year review period, DENR should conduct a full compliance inspection of the facility, and review these records. However, under the current permit, the Permittee need not keep the pertinent records long enough to allow DENR to conduct a full compliance review. DENR currently requires facilities permitted under the National Pollutant Discharge Elimination System

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<sup>84</sup> See Section III.X, *infra*.

("NPDES") program to maintain records for the entire term of the permit.<sup>85</sup> DENR should incorporate this best practice into the state general permit program, and amend Condition III.11 to require Permittee to maintain their records for five years.

#### S. Condition III.14

Proposed Condition III.14 gives the Director the discretion as to whether to require a Permittee to file an animal certification report based on compliance history. DENR should revise this condition to require all permitted facilities to submit a compliance report regardless of compliance history.

#### T. Condition III.15 to III.17

Proposed Conditions III.15, III.16, and III.17 set forth the steps the Permittee must follow when notifying DWR and the public that there has been a discharge of 1,000 gallons, 15,000 gallons, or 1,000,000 gallons or more of waste to surface waters or wetlands respectively. These conditions should be strengthened and standardized.

For example, DENR should use the same language across all three Conditions when describing the discharges. Condition III.15 refers to discharges of waste, while Condition III.16 refers to discharges of animal waste, and Condition III.17 refers to discharges of wastewater. The terms should be consistent across all three sections, and should be keyed to discharge of waste.

Conditions III.15 to III.17 require varying degrees of notice to DWR officials and the public. Condition III.15 requires the Permittee to issue a press release within forty eight hours of a discharge of 1,000 gallons or more of waste to surface waters or wetlands. Rather than giving the Permittee forty eight hours, however, DENR should require a press release as soon as possible, but at least within twenty four hours so that nearby communities avoid using affected waters. DENR also should specify the contents of the press release, including all of the

85-See, e.g., North Carolina Env'tl. Mgmt. Comm'n, DENR, Swine Waste Management System NPDES General Permit, NPDES Permit No. NCA200000, Condition I.5 ("A copy of this Permit, the facility's COC, certification forms, lessee and landowner agreements, the CAWMP, and copies of all records required by this Permit and the facility's CAWMP shall be readily available at the facility (stored at places such as the farm residence, office, outbuildings, etc.) where animal waste management activities are being conducted for the life of this Permit, unless otherwise specified in this Permit. These documents shall be kept in good condition, and records shall be maintained in an orderly fashion."); *id.* Condition IV.20 ("All records required by this permit and the facility's CAWMP, including but not limited to soil and waste analysis, rain-gauge readings, freeboard levels, irrigation and land application event(s), past inspection reports and operational reviews, animal stocking records, records of additional nutrient sources applied (including but not limited to sludges, unused feedstuff leachate, milk waste, septage and commercial fertilizer), cropping information, waste application equipment testing and calibration, and records of transfer of separated solids to off site location(s), shall be maintained by the Permittee in chronological and legible form for a minimum of five (5) years. These records shall be maintained on forms provided by, or approved by, the Division and shall be readily available for inspection.")

information required under Condition III.16. DENR should revise Condition III.17 to make it clear that in the event of a discharge of more than 1,000,000 gallons, the Permittee must issue both the press release required under Condition III.15 and the public notice required under Condition III.16, expanded to include the appropriate counties recommended by DWR.

DENR also should revise these conditions to require the Permittee to contact DWR within twelve hours of a discharge of 5,000 gallons or more. DWR and the Permittee should work together to develop a speedy response plan.

Finally, in all three instances, DENR should require the Permittee to maintain a copy of the press release and public notice for up to one year, and to provide DWR a copy of the notice and proof of publication.

#### U. Condition III.18

Proposed Condition III.18 grants facilities that have sludge accumulation that does not satisfy the NRCS Conservation Practice Standard No. 359 two years to comply with a sludge removal and waste utilization plan. Two years is far too much time. If a facility is not meeting best practices to control sludge in its lagoon, it should execute a plan to rectify the sludge situation within a year, not two. In addition, if the facility is not able to manage its waste, it should not generate more.

#### V. Condition IV.1

DENR should clarify that facilities that are permitted under the general permit are subject to random, unannounced inspections. The qualifier that inspections and other monitoring be conducted at "reasonable times" should not limit the scope of DENR's authority to conduct unannounced inspections to ensure that the Permittee is complying with the terms of the permit and its CAWMP.

#### W. Condition V.13

Proposed Condition V.13 provides that "[u]pon abandonment or depopulation for a period of four years or more, the Permittee must submit documentation to the Division demonstrating that all current NRCS standards are met prior to restocking of their facility." Abandonment and depopulation of animal feeding operations is and will continue to be a concern in North Carolina. Animal feeding operations generate and accumulate a large amount of animal waste. Closing the facilities or letting them languish raises the consummate threat of system breach and discharge, as does reopening facilities that have not been properly closed. Thus, in addition to setting standards for reopening the systems, the general permit should provide or reference concrete requirements as to how lagoon or other waste management system should be closed. In addition, depopulated facilities with closed lagoons that contain waste must be required to maintain a permit, and facility owners and DENR must continue to inspect the lagoon to ensure that it is not leaking.

Moreover, the reopening requirements must do more to address the consummate threat of waste management system breach and discharge resulting from abandonment and depopulation. Merely requiring the Permittee to demonstrate compliance with current NRCS standards is insufficient. Instead, the Permittee should have to demonstrate compliance with the performance standards contained in General Statute § 143-215.10f. In reopening, these facilities should be classified as new facilities regardless of whether they have retained their permit or not. At a minimum, before allowing the Permittee to reopen a facility that has been abandoned or depopulated, the Permittee should have to demonstrate that it is capable of complying with all legal parameters, including all aspects of its original permit and its CAWMP. Additionally, if the facility originally depopulated due to forced closure or enforcement, it should develop a detailed plan outlining the steps taken to rectify past violations.

## X. Information Collection

DENR should revise the general permit to ensure that Permittees share all of the information collected under the permit with DENR, and that DENR in turn makes this information available to the public. Under the proposed permit, DENR requires the Permittees to monitor and record, or analyze the following:

- ffi Assessments of the effectiveness the CAWMP (Condition I.3);
- ffi Freeboard Levels (Condition III.2);
- ffi The amount and type of precipitation for all precipitation events (Condition III.3);
- ffi Soil fertility (Condition III.4);
- ffi The amount of nitrogen, phosphorus, zinc, and copper in the waste (Condition III.5);
- ffi Information and irrigation and land application events, including the date, hydraulic loading rates, nutrient loading rates, and cropping information, as well as information as to whether solids were removed and how those solids were disposed (Condition III.6);
- ffi Waste transfers between structures on site that are not typically operated in a series (Condition III.7);
- ffi Monthly stocking records (Condition III.8);
- ffi Notification of discharges and other permit violations (Conditions III.9 and III.13); and
- ffi Records of waste equipment testing and calibration (Condition II.24).

DENR only collects a select few of these records: the monthly stocking records and notice of discharge or other permit violations. DENR should collect all of this information on a quarterly basis, and maintain a database containing this information that is readily accessible to the public. The public and experts could use this information to more fully understand the effect these operations have on the environment and human health.

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In addition to the issues raised above, the proposed general permits raised additional questions that we would be willing to discuss at a later date. For example, the undersigned have questions about the level of ponding allowed during waste application events (Condition II.5), when the permits allow spraying in windy conditions (Condition II.19), and the infrequency of the required soil fertility analysis (Condition III.4).

#### IV. DENR SHOULD REQUIRE DRY LITTER POULTRY FACILITIES TO OPERATE UNDER A PERMITTING PROGRAM

At the five year renewal period, DENR should not only be taking a hard look at ways to strengthen the general permits, but also should review the decision not to require dry litter poultry facilities to obtain coverage under a general permit.<sup>86</sup> Under current North Carolina regulations, poultry operations that use a dry litter waste management system are "permitted by regulation" and do not need to obtain an individual permit or apply for a certificate of coverage under the proposed general permit for poultry operations, AWG300000.<sup>87</sup> Yet dry litter facilities are not adequately controlled under the current "permitting by regulation" scheme, and thus these regulations should be repealed. DENR should require these facilities to obtain a certificate of coverage under the general permitting program, or individual permits. In the meantime, DENR should require those facilities that violate the conditions for being deemed permitted to come under the general permit, or obtain individual permits, to continue operating.

Dry litter poultry operations threaten water quality and the health and welfare of neighboring communities. Many dry litter facilities store their waste outside in uncovered, unlined piles. For the large facilities (those housing more than 30,000 birds), the deemed permitting regulations simply require the waste to be applied or covered within 15 days.<sup>88</sup> However, for each of those 15 days, these unlined piles are exposed to the elements, risking a discharge to surface waters. Indeed, rain can wash the waste into nearby creeks and streams, and wind can blow the waste into waters. Moreover, the piles themselves also can leach waste into the ground, where it can contaminate groundwater and drinking water sources.<sup>89</sup> EPA itself recognized that dry litter poultry operations pose a risk to surface water and ground water

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⁸⁶ The signatories to this letter will continue to engage with DENR about the best way to regulate dry litter poultry facilities in the coming months.

⁸⁷ Dry litter poultry operations with 30,000 or more birds are deemed permitted if they meet five generic operational "criteria." 15A NCAC § 2T.1303(a)(2). All other dry litter operations are deemed permitted without condition, ostensibly because they are "[s]ystems that do not meet the criteria of an animal operation permitted under Rule 1304 or Rule 1305." 15A NCAC § 2T.1303(a)(1)(2); see also N.C. Gen. Stat. § 143-215.10B(1) (defining "animal operation" so as to exclude dry litter operations).

⁸⁸ 15A NCAC § 2T.1303(a)(2)(D).

⁸⁹ For example, the photograph attached as Exhibit 3 shows piles of dry litter poultry waste exposed to the elements.

quality from improper storage of dry manure and improper land application.⁹⁰ The current system, therefore, does not protect North Carolina's water, air, or citizens from harmful pollution from the dry litter systems.

Covering these dry litter poultry facilities under a general permit program is an important first step to ensuring that they are not unduly burdening the environment and neighboring communities. For example, requiring dry litter facilities to affirmatively obtain a permit would bring them onto the radar screen. Given the current failure to affirmatively permit dry litter facilities, the state does not have a comprehensive list of the facilities and their locations, and thus does not routinely take steps to ensure that they are meeting even basic requirements to protect ground and surface water, such as covering waste.⁹¹ In practical terms, DENR has relied on environmentalists and citizens to monitor these facilities and report violations, which provides only ad hoc and inconsistent information. Rather than waiting for environmentalists and citizens to inspect the facilities and report violations of the regulations, DENR should take a more active role and at the very least require the facilities to come under the general permit program.

DENR has the authority to require dry litter facilities to operate under the poultry waste management system general permit. Under North Carolina law, all animal waste management systems, including systems serving a dry litter poultry facility, must be permitted.⁹² Nothing on the face of the proposed general permit limits its application to poultry facilities using a wet waste management system; the general permit indicates that it "may apply to any poultry facility in the State of North Carolina." Thus, DENR should repeal the permitting by regulation

⁹⁰ See NPDES Permit Regulations and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 68 Fed. Reg. 7,176, 7,208 (Feb. 12, 2003) (promulgating rules defining certain dry litter poultry facilities as concentrated animal feeding operations because "[n]utrients from large poultry operations continue to contaminate surface waters because of rainfall coming in contact with dry manure that is stacked in exposed areas, accidental spills, etc.") (codified at 40 C.F.R. pt. 412, subpt. D).

⁹¹ See DENR, Tar Pamlico River Basinwide Water Quality Management Plan at 22 (2010), available at <http://portal.ncdenr.org/web/wq/ps/bpu/basin/tarpamlico/2010> ("Most poultry operations produce a dry litter by product which is not regulated. The locations of poultry operations and the disposal of their waste is not known to environmental regulators due to the fact that there are no permitting requirements, making it very difficult to get a complete picture of the possible non point sources contributions within a specific watershed. This makes managing and protecting water quality more challenging.")

⁹² See N.C. Gen. Stat. § 143-215.1(a)(12) (requiring a permit to "[c]onstruct or operate an animal waste management system, as defined in G.S. 143-215.10B"). An animal waste management system is "a combination of structures and nonstructural practices serving a feedlot that provide for the collection, treatment, storage, or land application of animal waste." *Id.* § 143-215.10B(3). A feedlot, in turn, is "a lot or building or combination of lots and buildings intended for the confined feeding, breeding, raising, or holding of animals and either specifically designed as a confinement area in which animal waste may accumulate or where the concentration of animals is such that an established vegetative cover cannot be maintained." *Id.* § 143-215.10B(5). Dry litter poultry operations, thus employ animal waste management systems that must be permitted.

rules applicable to dry litter poultry facilities and exercise its authority to bring dry litter poultry operations under the general permits.

At a minimum, short of revising the regulations, DENR should immediately require facilities that violate the regulations allowing them to be "deemed permitted" to obtain coverage under an individual or general permit. One of the most frequently violated prohibitions under the permitting-by-regulation scheme is the prohibition against storing waste outside and uncovered for more than 15 days. Once a facility has stored its waste outside for more than 15 days, it is considered to have a wet waste management program⁹³ that immediately is subject to permitting under the current general permit, or in the event of a discharge, a National Pollutant Discharge Elimination System permit.⁹⁴ DENR has the authority to revoke the "deemed permitted" status in response to these violations and require the facilities to obtain coverage under an individual or general permit⁹⁵; yet DENR has yet to take even this basic step to protect water quality. Going forward, DENR should ensure that dry litter facilities that flout basic protections and threaten water quality immediately obtain an individual permit or a certificate of coverage under the general permit.

⁹³According to recent EPA policy, poultry animal feeding operations "that stack or pile manure in areas exposed to precipitation are considered to have liquid manure handling systems." See EPA, NPDES Permit Writers' Manual for Concentrated Animal Feeding Operations, EPA-833-F-12-001, § 2.2.4 at 2-8 (Feb. 2012), available at <http://cfpub.epa.gov/npdes/afo/info.cfm>. However, permitting authorities can authorize the temporary storage of litter outside in areas exposed to precipitation for less than 15 days, and such storage will not result in the system having a liquid manure handling system. *Id.*

⁹⁴Under North Carolina law, an agricultural feedlot with 30,000 or more confined poultry with a liquid animal waste management system is an animal operation. N.C. Gen. Stat. § 143-215.10B(1). DENR requires animal waste management systems for animal operations to obtain either a state general permit or a NPDES permit. See 15A NCAC §§ 2T.1304-05.

⁹⁵See 15A NCAC § 2T.0113(e) ("The Director may determine that a disposal system should not be deemed to be permitted, and require the disposal system to obtain an individual permit or a certificate of coverage under a general permit. This determination shall be made based on existing or projected environmental impacts, compliance with the provisions of this Rule or other Permitted-by-Regulation rules in this Subchapter, and the compliance history of the facility owner.").

V. CONCLUSION

Thank you for the opportunity to provide comments on the proposed general permits for animal waste management systems. We appreciate the opportunity to provide input on North Carolina's permitting program and to work together to ensure that animal waste management systems throughout the state do not pollute North Carolina's water and air and operate consistently with principles of environmental justice.



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Exhibit 1



Exhibit 2



Exhibit 3



Exhibit 4

Industrial Hog Operations in North Carolina Disproportionately Impact African-Americans, Hispanics and American Indians

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August 29, 2014

Summary

Background: In 2014, the North Carolina Department of Environment and Natural Resources (NC-DENR) issued a swine waste management general permit (the General Permit), which is expected to cover more than 2,000 industrial hog operations (IHOs). These facilities house animals in confinement, store their feces and urine in open pits, and apply the waste to surrounding fields. Air pollutants from the routine operation of confinement houses, cesspools, and waste sprayers affect nearby neighborhoods where they cause disruption of activities of daily living, stress, anxiety, mucous membrane irritation, respiratory conditions, reduced lung function, and acute blood pressure elevation. Prior studies showed that this industry disproportionately impacts people of color in NC, mostly African Americans.

Methods: We obtained records on the sizes and locations of permitted IHOs from NC-DENR and calculated the steady state live weight (SSLW) of hogs as an indicator of the amount of feces and urine produced at each IHO. We obtained block-level information on race and ethnicity from the 2010 census of the United States. We compared the proportions of people of color (POC), Blacks, Hispanics, and American Indians living within 3 miles of an IHO to the proportion of non-Hispanic Whites. We quantified relationships between race/ethnicity, presence of one or more IHOs, and the SSLW of IHOs, using Poisson regression and linear regression to adjust for rurality.

Results: Analyses based on a study area that excludes the state's five major cities and western counties that have no presence of this industry show that the proportion of POC living within 3 miles of an industrial hog operation is 1.52 times higher than the proportion of non-Hispanic Whites. The proportions of Blacks, Hispanics and American Indians living within 3 miles of an industrial hog operation are 1.54, 1.39 and 2.18 times higher, respectively, than the proportion of non-Hispanic Whites ($p < 0.0001$). In census blocks with 80 or more percent people of color, the proportion of the population living within 3 miles of an industrial hog operation is 2.14 times higher than in blocks with no people of color. This excess increases to 3.30 times higher with adjustment for rurality. Adjusted for rurality, the SSLW of hogs within 3 miles of a census block increases, on average, 100,000, 64,000, 243,000, and 93,000 pounds for every 10 percent increase in POC, Black, Hispanic, and American Indian population ($p < 0.0001$).

Conclusions: IHOs in NC disproportionately affect Black, Hispanic and American Indian residents. Although we did not examine poverty or wealth in this study, the results are consistent with previous research showing that NC's IHOs are relatively absent from low-poverty White communities. This spatial pattern is generally recognized as environmental racism.

Background

Swine production in North Carolina (NC) changed dramatically during the last decades of the 20th century. Between 1982 and 2006 the number of hog operations in the state declined precipitously while the hog population increased from approximately 2 to 10 million (Edwards and Driscoll 2009). Production became concentrated in eastern NC (Furuseth 1997).

Traditional NC producers raised small numbers of hogs, commonly fewer than 25, and hogs were one of several commercial crops on diversified farms (Edwards and Driscoll 2009). In contrast, industrial producers raise large numbers of hogs, often many thousands, in confinement houses that are designed to vent toxic gases and particles into the environment. Animal wastes are flushed into open cesspools and then sprayed on nearby fields. Pollutants emitted by IHOs include hydrogen sulfide, ammonia, a wide array of volatile organic compounds, and bioaerosols including endotoxins and other respiratory irritants (Cole et al. 2000) (Schiffman et al. 2001).

The negative impacts of particles and gases inside IHO confinements on worker health have been extensively described (Cole et al. 2000; Donham 1993; Donham et al. 1995; Donham et al. 2000; Donham 1990). Environmental pollutants from IHOs affect people who are more susceptible than workers due to young or old age, asthma or allergies, or other conditions. An extensive body of peer-reviewed scientific evidence shows that IHOs release contaminants into neighboring communities where they affect the health and quality of life of neighbors. Many of these studies have been conducted in NC. Hydrogen sulfide concentrations within 1.5 miles of IHOs in NC are associated with neighbors' ratings of hog odor and inability to engage in routine daily activities (Wing et al. 2008), increased stress and anxiety (Horton et al. 2009), irritation of the eyes, nose and throat, respiratory symptoms (Schinasi et al. 2011), and acute elevation of systolic blood pressure (Wing et al. 2013). A study of NC public middle school children who participated in an asthma survey, which was conducted by the NC Department of Health and Human Services, found that children attending schools within three miles of an IHO had more asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits than students who attended schools further away (Mirabelli et al. 2006). The same study reported a 23% higher prevalence of wheezing symptoms among children who attended schools where staff reported noticing livestock odor inside school buildings twice or more per month compared to children who attended schools where no livestock odor was reported (Mirabelli et al. 2006). Other studies in NC (Tajik et al. 2008) (Wing and Wolf 2000) (Bullers 2005) (Schiffman et al. 1995) and elsewhere (Donham et al. 2007) (Thu et al. 1997) (Radon et al. 2007) also document negative impacts of IHO air pollution on neighbors' health and quality of life.

Liquid contaminants from IHOs are released to the environment through leakage of animal waste storage pits, runoff from land application of liquid wastes, atmospheric deposition, and failure of the earthen walls of waste pits (Burkholder et al. 2007). Overflow of waste pits during heavy rain events results in massive spills of animal waste into neighboring communities and waterways. For example, in late September, 1999, 237 NC IHOs were located in flooded areas identified from satellite imagery provided by the NC Division of Emergency Management (Wing et al. 2002). Parasites, bacteria, viruses, nitrates, and other components of liquid IHO waste pose threats to human health (Burkholder et al. 2007; Cole et al. 2000).

Routine use of sub-therapeutic doses of antibiotics to promote weight gain of hogs promotes antibiotic resistance, making infections in humans more difficult to treat (Silbergeld et al. 2008). Airborne bacteria, including antibiotic resistant strains, have been isolated from IHO air emissions (Schulz et al. 2012) (Green et al. 2006) (Gibbs et al. 2006), and antibiotic resistant bacteria are associated with animal vectors near industrial animal operations, including flies (Graham et al. 2009), rodents (van de Giessen et al. 2009), and migratory geese that land on NC's IHO liquid waste pits (Cole et al. 2005). A recent medical records study from Pennsylvania shows that people living near IHO liquid waste application sites have elevated rates of infection with methicillin resistant *Staphylococcus aureus* (Casey et al. 2013). NC industrial livestock workers carry strains of *Staphylococcus aureus* that are associated with swine, including antibiotic resistant strains (Rinsky et al. 2013). These bacteria could be spread by liquid waste and airborne particles.

Using information from the United States Census of 1990 and locations of IHOs reported by the North Carolina Department of Environment and Natural Resources (NC-DENR) in 1998, we showed that the state's IHOs were disproportionately located in areas where more people of color (POC), primarily African Americans, live (Wing et al. 2000). We concluded that their disproportionate location in communities of color represented an environmental injustice. Since 1998 additional IHOs have obtained permission to operate and others are no longer in business. Additionally, between 1990 and 2010 the state's population size and spatial distribution changed due to births, deaths and migration. In this report we update our previous findings by evaluating whether IHOs operating under the general permit issued on March 7, 2014, will disproportionately impact POC, Blacks, Hispanics, and American Indians.

Materials and Methods

Lacking a list of the unique IHOs operating under the General Permit finalized in 2014, we used a list of all permitted industrial animal operations provided by NC-DENR on January 24, 2013 that we had prepared for prior research. First we excluded all non-swine operations from the list. Next we excluded swine operations with expired permits and permits with an allowable head count equal to zero. We also excluded permits that did not appear on a list of permitted animal operations published by DENR in January, 2014. We merged multiple permits issued for the same facilities to obtain a total head count for each operation. However the head count may be misleading as a measure of the pollution from each IHO because some facilities primarily house small pigs while others primarily house large hogs. We therefore calculated each facility's total steady state live weight (SSLW) using NC-DENR's formula based on the number and average weight of each growth stage of swine permitted at the facility. We interpret SSLW as a summary measure of the feces and urine produced by the swine of different growth stages at each facility.

Following the protocol provided in our previous study we excluded facilities operated by research institutions because they are subject to different location and management decisions than are commercial operations (Wing et al. 2000). Finally, we excluded facilities that do not hold a certificate of coverage to operate under the General Permit because they operate under individual permits or National Pollutant Discharge Elimination System general permits. The resulting facilities should closely approximate those expected to seek to continue operating under

the renewed General Permit. The renewed General Permit takes effect on October 1, 2014, at which time we plan to update the list created for this research.

The vulnerability of people of any race/ethnicity to having polluting facilities nearby can be affected by the race and ethnicity of other people in their community. For example, African-Americans who live in areas primarily populated by non-Hispanic Whites have, generally, a lower susceptibility to being near polluting facilities than African-Americans who live in areas primarily populated by Hispanics or American Indians. We therefore conducted our primary analyses of disproportionate impact using the POC category. We also conducted analyses for specific racial/ethnic categories. We defined the following racial/ethnic categories: non-Hispanic White (non-Hispanics who identified as White and no other race), POC (all people not categorized as non-Hispanic white), Black (people who identified themselves as African-American or Black with or without any other race), Hispanic of any race, and American Indian (people who identified themselves as American Indian with or without any other race). We used block-level race/ethnicity-specific population counts from the US Census of 2010.

As large-scale agricultural facilities, IHOs are not located in major cities. Following the protocol adopted in our prior research, we defined a study area for our primary analyses that excluded census blocks in the five major metropolitan areas of NC (Charlotte, Winston Salem, Greensboro, Durham and Raleigh) as well as 19 western counties that neither have an IHO nor border a county that has an IHO. We conducted additional analyses for the entire state.

We considered residents of blocks to be affected by IHOs within three miles of the block centroid. Blocks were categorized as either having, or not having, an IHO within three miles. Additionally, we calculated the total permitted SSLW of hogs within three miles of the centroid of each block as a measure of the total potential influence of pollutants from nearby IHOs on the residents of the block.

As in our prior study, we also calculated the population density of each block, defined as the number of people per square mile. Population density is a measure of rurality, which is strongly related to the availability of land for agriculture and the price of land. Racial/ethnic groups in NC differ in their urban vs. rural residence, making them differentially susceptible to types of polluting facilities that locate in rural vs. urban locations. For example, a larger proportion of non-Hispanic Whites in NC live in remote rural areas than do Blacks, the racial comparison is affected not only by the susceptibility of Whites vs. Blacks to IHOs, but also by differences in whether they live in rural vs. urban areas. By adjusting for population density (or rurality), we compare racial vulnerability to IHOs for racial groups within each level of rurality. This adjustment is analogous to other statistical adjustments in epidemiology, as when the death rates of two countries are compared: even though death rates at every age may be higher in a poor than a rich country, the poor country may have a lower overall death rate simply because it has a younger age distribution. In that case, age-adjustment is used to compare mortality in the two countries just as we use density-adjustment to compare the proximity to IHOs in areas with different racial/ethnic make-up.

We used weighted Poisson regression to quantify relationships between race/ethnicity and the presence of one or more IHOs within three miles of a block. We used weighted linear regression to quantify relationships between race/ethnicity and the SSLW of hogs permitted within three miles of a block. We used census block populations as weights. In density-adjusted models we included variables for the natural log of population density raised to the first, second and third power. As in our prior analysis, this cubic model fit the data well and additional power terms added little to the model fit (Wing et al. 2000). For the two largest racial/ethnic groups other than non-Hispanic Whites, POC and Blacks, we categorized race/ethnicity in groups of blocks 20% in width compared to blocks with no POC using indicator variables. Due to smaller numbers in these categories we did not fit models with indicator variables for Hispanics and American Indians. We also considered the percent of population of each race/ethnicity as a continuous variable, estimating the added burden of IHOs for a 10% increase in the population.

This study involves neither random sampling nor randomization of exposure to IHOs, therefore statistical significance testing is inappropriate and confidence intervals do not correspond to the probability that the true values of measures of association are within the interval. However, the US-EPA considers statistical significance in its assessment of environmental racism. We therefore report p-values for differences in proportions of each racial/ethnic group within 3 miles of an IHO using t-tests. We report 95% confidence intervals (CIs) as measures of precision of the associations estimated from regression models. 95% CIs that exclude the null value (1.0 for ratios and 0.0 for differences) are commonly considered to be statistically significant at $p < 0.05$.

Results

We estimate that 2,055 IHOs were operating under the General Permit in January 2014, and that they were permitted to house approximately 1.2 billion pounds of swine (Table 1). The 160 (7.7%) IHOs permitted to house between 20 and 100 thousand pounds accounted for only 1% of the total permitted SSLW. The 342 (17.2%) IHOs permitted to house between 1 and 10.2 million pounds accounted for 46.5% of the total.

Table 2 shows that there are over 6.5 million residents of the study area. Approximately 986,000 (15.1%) of these live in census blocks whose centroid is within 3 miles of an IHO that operates under the General Permit. This includes 602,380 non-Hispanic Whites and 383,522 POC. 13.1% of non-Hispanic Whites and 19.9% of POC in the study area live in blocks within 3 miles of an IHO.

Based on the study area population in Table 2, Table 3 shows ratios of percentage of POC living within 3 miles of an IHO compared to the percentage of non-Hispanic Whites living within 3 miles of an IHO. The percentage of POC living within 3 miles of an IHO is 1.52 times higher than the percentage of non-Hispanic Whites. The percentages of Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.54, 1.39 and 2.18 times higher, respectively, than non-Hispanic Whites. If residents of the study area had been randomized to live within 3 miles of an IHO, the probabilities of observing differences of these magnitudes or greater are less than 0.0001; the observed differences are considered to be highly statistically significant.

We calculated these same ratios based on the entire state population of 9,535,483. The percentages of POC, Blacks, Hispanics and American Indians living within 3 miles of an IHO are 1.38, 1.40, 1.26 and 2.39 times higher than the percentage of non-Hispanic Whites, respectively. These ratios are considered to be highly statistically significant.

Figure 2 shows the percent of people living within 3 miles of an IHO in relation to the percent of people of color in blocks. In areas with less than 20% POC, just over 10% of the population lives within 3 miles of an IHO. In areas with 60-80% POC, over 20% of the population lives so close to an IHO. In areas with more than 80% POC, more than a quarter of the population lives within 3 miles of an IHO.

Table 4 presents ratios of the percent of people living within 3 miles of an IHO in blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. The total population in these categories ranges from 526,305 in blocks with 60 to <80% POC to 2,577,015 in blocks with >0 to <20% POC. Ratios are statistically significantly elevated for all areas with more than 40% POC with or without adjustment for rurality. Ratios on the right side of Table 4 are adjusted for rurality. These ratios increase with the percentage POC. The highest ratios occur in areas with more than 80% POC, where over three times as many people live near IHOs, adjusted for rurality, compared to areas with no POC. These excesses are considered to be highly statistically significant.

Table 5 shows the results of analyses for Blacks parallel results to in Table 4 for all POC. Although ratios are somewhat lower for Blacks than POC, the percent of people living within 3 miles of an IHO is statistically significantly elevated in all groups of blocks that are more than 40% Black, with or without adjustment for rurality. In areas that are 80% or more Black, twice as many people live within 3 miles of an IHO compared to areas with no Blacks, a disparity that increases to three times more with adjustment for rurality. These excesses are considered to be highly statistically significant.

Table 6 presents the increased percent of the population living within 3 miles of an IHO for each additional 10 percent of the population of POC, Blacks, Hispanics, and American Indians. This analysis is similar to the results in Tables 4 and 5, but rather than using categories, the relationship between race/ethnicity and proximity to IHOs is modelled as a linear function. For every ten percent increase in POC, the proportion of people residing within 3 miles of an IHO increases, on average, by 10.7%. These values are 9.4, 8.5, and 16.2 for Blacks, Hispanics, and American Indians, respectively. Adjusting for rurality, 14.8% more people reside within 3 miles of an IHO for each additional ten percent POC. Adjusted values are 13.0, 16.3 and 11.8 for Blacks, Hispanics and American Indians, respectively. These linear relationships between race/ethnicity and living near IHOs are considered to be highly statistically significant.

Table 7 shows the difference in SSLW of hogs within 3 miles of residents of blocks with >0 to <20%, 20 to <40%, 40 to <60%, 60 to <80% and 80 to 100% POC compared to blocks with no POC. Blocks in categories with more than 20% POC have, on average, between 177 and 510 thousand pounds more hogs within 3 miles than blocks with no POC. Adjusting for population density, blocks with more than 60 percent POC have, on average, more than three-quarters of a

million pounds more hogs permitted within 3 miles than areas with no POC. These excesses are considered to be highly statistically significant.

Table 8 presents parallel results for percentage Black population. As for POC, areas with more than 20% Black residents have an excess SSLW of hogs compared to areas with no Black residents, and differences are greater with adjustment for rurality. Adjusted for population density, blocks with more than 40% Black residents have between 493,000 and 620,000 more pounds of hogs within 3 miles than areas with no Black residents. These excesses are considered to be highly statistically significant.

Table 9 provides the average additional SSLW of hogs permitted in areas with POC for each percent increase in specific racial/ethnic categories. Adjusted for population density, the permitted SSLW of hogs within 3 miles of blocks increases 100, 64, 242, and 92 thousand pounds for each ten percent increase in POC, Black, Hispanic, and American Indian population, respectively. These linear relationships between race/ethnicity and SSLW are considered to be highly statistically significant.

Figure 3 depicts the data analyzed above. Each dot represents an IHO that was operating under the General Permit in 2014. IHOs are concentrated in NC's Coastal Plain Region, between the Piedmont and Tidewater. The red areas of Figure 3 indicate that this region has more people of color than other parts of the study area.

Conclusion

IHOs operating under the NC-DENR General Permit in 2014 are disproportionately located near communities of color. The disparities are considered to be highly statistically significant for Blacks, Hispanics, American Indians, and all POC. IHOs pollute local ground and surface water. They routinely emit air pollutants that negatively impact the quality of life and health of nearby residents. In addition to their well-documented effects on physical, mental and social well-being, residents of areas with a high density of IHOs, and especially residents of color, have been subjected to intimidation including threats of legal action, violence, and job loss (Wing 2002). The industry's close ties with local and state government officials help it to avoid regulation that could protect neighbors, and creates barriers to democracy in rural communities of color (Thu 2001, 2003). These discriminatory impacts could be reduced by decreasing the density of production and use of technologies that prevent releases of pollutants.

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Figure 1
North Carolina study area, 2014

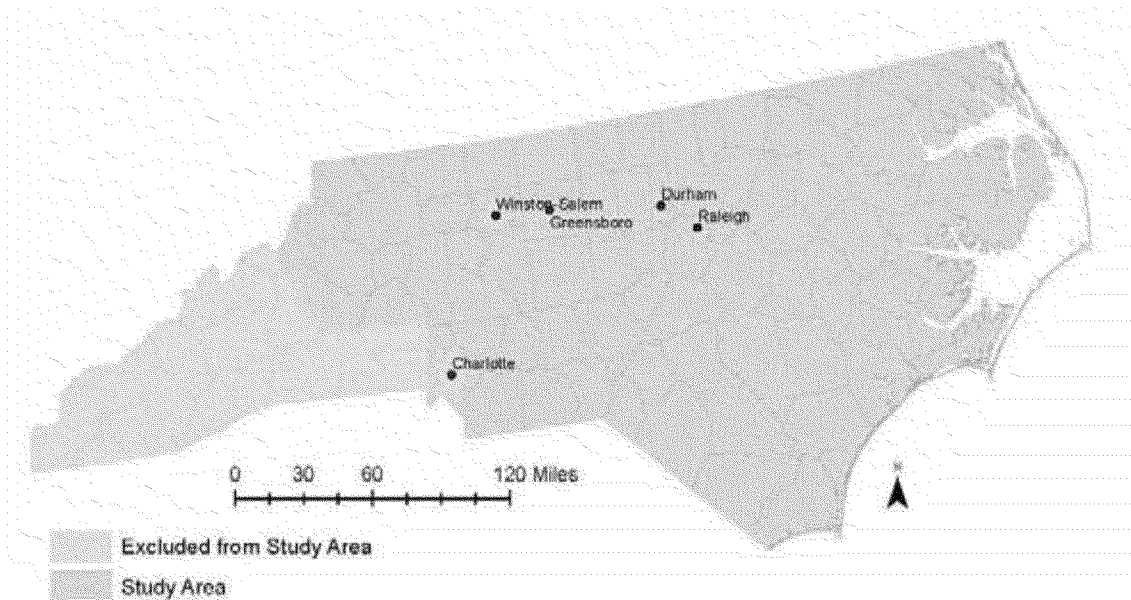


Figure 2
Percent of population living within 3 miles of an IHO
in relation to percent people of color, NC, 2014

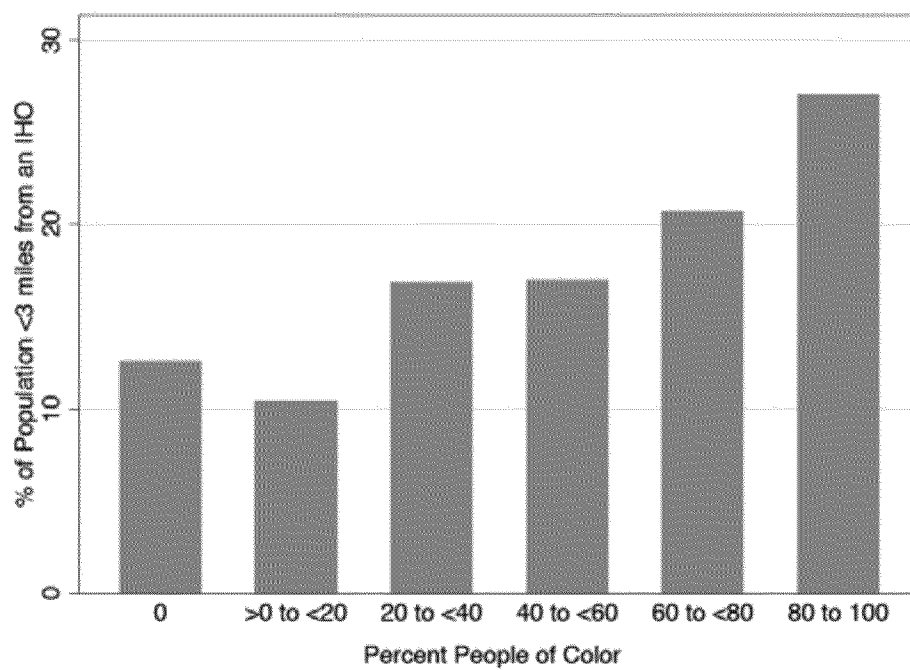


Figure 3
Racial and ethnic composition of census blocks and the locations
of NC IHOs operating under the General Permit, 2014

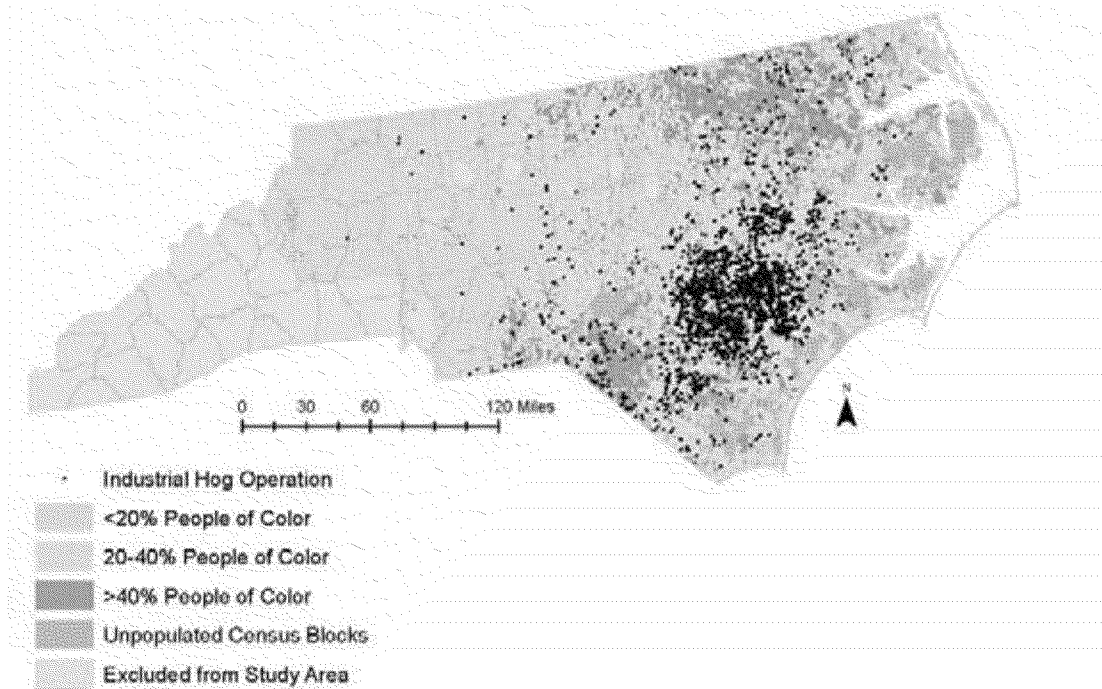


Table 1
Steady state live weight of IHOs
operating under the General Permit, NC, 2014

Permitted SSLW ¹	Number of IHOs	Percent of IHOs	Total SSLW ¹	Percent of total SSLW
20-	160	7.7	12,574	1.0
100-	447	21.6	76,626	5.9
250-	577	28.1	222,003	17.1
500-	529	25.4	383,918	29.6
1,000-10,200	342	17.2	603,354	46.5
Total	2055	100.0	1,298,474	100.0

¹Thousands of pounds

Table 2
Racial and ethnic composition of NC census blocks within 3 miles
of an IHO and more than 3 Miles of an IHO, 2014

			<u>>3 miles from an IHO</u>		
Racial Category	Number	Percent	Number	Percent	Total ¹
Non-Hispanic white	602,380	13.1	4,003,455	86.9	4,605,835
POC ¹	383,522	19.9	1,548,276	80.1	1,931,798
Black	277,199	20.2	1,096,795	79.8	1,373,994
Hispanic	92,679	18.1	418,292	81.9	510,971
American Indian	40,621	28.5	101,872	71.5	142,493
Total ¹	985,902	15.1	5,551,731	84.9	6,537,633

¹POC can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

Table 3
Ratios of POC compared to non-Hispanic Whites living within 3 Miles
of an IHO operating under the General Permit, 2014

Racial/ethnic Category	Population	Number	Percent	Ratio ²	p-value ³
Non-Hispanic white	4,605,835	602,380	13.1	1.00	--
POC ¹	1,931,798	383,522	19.9	1.52	<0.0001
Black	1,373,994	277,199	20.2	1.54	<0.0001
Hispanic	510,971	92,679	18.1	1.38	<0.0001
American Indian	142,493	40,621	28.5	2.18	<0.0001
Total ¹	6,537,633	985,902	15.1		

¹People of color can be counted in more than one racial/ethnic category. The total population is equal to the number of non-Hispanic Whites plus the number of POC.

²Ratio of the percent of people of other racial/ethnic groups to percent of non-Hispanic Whites living within 3 miles of an IHO

³A difference in proportions of this magnitude or greater would be expected to occur less than one time in ten thousand if people of different racial/ethnic groups had been randomized to live within 3 miles of an IHO.

Table 4
Ratios comparing the percent of people residing within 3 miles of an IHO
in blocks with POC compared to blocks with no POC

Percent POC	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted ¹ Prevalence Ratio	95% CI
0	694,747	1.0	referent	1.00	referent
>0 to <20	2,577,015	0.83	0.82, 0.83	1.01	1.00, 1.02
20 to <40	1,364,923	1.34	1.33, 1.45	1.95	1.93, 1.97
40 to <60	799,124	1.35	1.34, 1.36	2.15	2.13, 2.16
60 to <80	526,305	1.64	1.62, 1.65	2.53	2.50, 2.55
80 to 100	575,519	2.14	2.12, 2.16	3.30	3.27, 3.32

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 5
Ratios comparing the percent of people residing within 3 miles of an IHO
in blocks with Black residents compared to blocks with no Black residents

Percent Black	Population	Unadjusted Prevalence Ratio	95% CI	Adjusted ¹ Prevalence Ratio	95% CI
0	1,308,061	1.00	referent	1.00	referent
>0 to <20	2,941,746	0.93	0.92, 0.94	1.20	1.19, 1.21
20 to <40	1,043,277	1.44	1.43, 1.45	2.07	2.05, 2.08
40 to <60	536,198	1.52	1.51, 1.53	2.18	2.17, 2.20
60 to <80	336,232	1.57	1.56, 1.59	2.19	2.17, 2.21
80 to 100	372,119	2.01	1.99, 2.02	3.06	3.04, 3.09

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 6
Percent difference in the percent of people residing within 3 miles of an IHO for a ten percent
increase in the population of each racial/ethnic group

Racial/ethnic group	Unadjusted Percent	95% CI	Adjusted ¹ Percent	95% CI
POC	10.7	10.6, 10.8	14.8	14.7, 14.9
Black	9.4	9.3, 9.4	13.0	12.9, 13.1
Hispanic	8.5	8.4, 8.6	16.3	16.1, 16.4
American Indian	16.2	16.0, 16.4	11.8	11.6, 12.0

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

Table 7
Difference in SSLW of hogs within 3 miles of residents of blocks
with POC compared to blocks with no POC

Percent POC	Unadjusted SSLW ²	95% CI	Adjusted ¹ SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-35	-73, 3	190	154, 227
20 to <40	177	136, 219	535	495, 575
40 to <60	308	262, 353	717	672, 762
60 to <80	510	459, 561	896	846, 946
80 to 100	453	403, 503	837	788, 885

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

²1,000s of pounds

Table 8
Difference in SSLW of hogs within 3 miles of residents of blocks
with Black residents compared to blocks with no Black residents

Percent Black	Unadjusted SSLW ²	95% CI	Adjusted ¹ SSLW	95% CI
0	Referent	-	Referent	-
>0 to <20	-4	-33, 25	237	207, 265
20 to <40	190	153, 227	493	457, 530
40 to <60	327	281, 372	620	576, 665
60 to <80	275	221, 330	547	494, 599
80 to 100	165	113, 218	494	444, 545

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

²1,000s of pounds

Table 9
Difference in SSLW of hogs within 3 miles of residents of blocks for a ten percent increase in
population of each racial group

Racial/ethnic group	Unadjusted SSLW ²	95% CI	Adjusted ¹ SSLW	95% CI
POC	67	63, 71	100	96, 104
Black	38	34, 42	64	60, 68
Hispanic	183	174, 192	242	234, 251
American Indian	124	111, 137	92	80, 105

¹Adjusted for rurality using a cubic polynomial of the natural log of population density

²1,000s of pound

Exhibit 5

ANONYMOUS DECLARATION I

1. It is my wish for my name to remain anonymous for this statement. I am of legal age and competent to give this declaration. All of the information herein is based on my own personal knowledge unless otherwise indicated.

Background

2. I am African-American and live in the town of Wallace, in Duplin County, North Carolina. I live here with my family

3. I am thirty-one years of age.

4. I live with my family here in Wallace, near a hog farm. There are several farms within a quarter-mile of my house in every direction. One of the farms sprays very close to the right side of my home.

Experience Living Next to the Hog Facility

5. I can't sit out on the porch because the smell from the hog farms is unbearable, especially when it's hot outside.

6. I had a friend who lived down the road and when I went to visit him, I often would see a mist of hog waste coming off the fields from where the farms were spraying. Because I wanted to see my friend, and had no other way of getting there, I would walk down the road anyway, but I was careful to cover my mouth and nose with my shirt so that I didn't have to breathe in the hog waste.

7. My mom and sister used to go down the road sometimes, but often they would have to turn around and come back home because the smell from the hog farms was so bad. We all used to go further down the road together when I was young, but the smell has gotten worse over time, and it has prevented us from taking walks outside.

8. It seems as if the hog farm sprays near my home around three times per week at inconsistent times of the day.

9. The odor is terrible when they spray, especially when it's hot outside. I try to be gone a lot, to stay with a friend who does not live near a hog farm. I try not to come home or be outside when they are spraying.

10. My eyes get watery from the smell of the hog waste. The closest farm to us used to have just one sprayer that gushed the waste. Recently, the farm installed little sprinklers – maybe five or six sprinklers that are set out around the sprayfield. The new sprinkles have finer streams, but they have not stopped the smell. The farmer also planted trees at the farm closest to my home to try to block the mist and hide the lagoons like they don't even exist. The trees help block some of the mist that used to get into our yards, but it hasn't stopped the problem. My family can still smell when they spray. It's hardly liveable.

11. There are people in my family with chronic health conditions already. Living near the hog farms does not help.

12. I have concerns about living near the hog farms. We use the town water for laundry, watering plants, and brushing our teeth. We do not use the well water anymore because we think it may be contaminated from the hog farms.

13. I don't grill outside or have cookouts because of the smell from the hog farms. My dad cooked outside for my uncle's funeral, but everyone stayed inside while he was cooking and when we were eating because we didn't want to smell the hog farms. When my dad was younger he used to grill a lot and have a lot of cookouts. We stopped having family gatherings and cookouts here because of the smell from the hog farms. We don't host family events here anymore unless we can stay inside, away from the smell from the hog facilities. We would like to have more family gatherings here, but it's hard to do it because of the spray smell.

14. My great-grandmother used to leave clothes outside to dry, but when the hog facilities moved into our area, she couldn't do it anymore. If she left the clothes on the line, there would be little yellow spots on them from the mist from the hog waste. My family complained to the hog farmers about how the spraying was ruining our clothes, and preventing us from being outside, but they do not seem to care. They are rude and mean to my family, and have refused to clean up their act.

15. I think property values are low here because we are so close to the hog farms.

16. I have talked with other people in my community about how we can try to fix the problem of all the hog farms polluting our town and affecting our health and welfare. It's not good that there is so much waste, and it's all very close. Most people are quiet about the hog farm issue. The hog farms are all around, so people must figure it is legal, but it should not be legal for the hog farms to spray waste where people live, and pollute the air and water and affect people's health.

17. I think North Carolina needs to change the law to protect communities from the hog farms. The hog farms need to use a better way to treat their waste. The hog farms should be responsible for figuring out a better way to dispose of the hog waste because they are the ones that are making money off of the hogs. The waste is part of their business, and they should be responsible for cleaning up.

18. I'm protective of my family. They're clearly frustrated that the hog farms are allowed to pollute our air and water and harm the community and it is wearing them down. I want to leave this area—because it's so hard to live near the hog farms—but I'm very close to my family and they are all concentrated around here. The hog farms cannot make us move off of our property.

I declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief.

Statement verified in Duplin, North Carolina on August 29, 2014.

Exhibit 6

DECLARATION OF **Ex. 6 - Personal Privacy**

1

1. My name is **Ex. 6 - Personal Privacy**. I was born on **Ex. 6 - Personal Privacy** and am of legal age and competent to give this declaration. All of the information herein is based on my own personal knowledge unless otherwise indicated.

Background

2. I have lived in New Bern, North Carolina since **Ex. 6 - Personal Privacy**. My current address is **Ex. 6 - Personal Privacy** in New Bern, North Carolina, 28560.

3. I have experience with swine confined animal feeding operations (CAFOs) as a resident of eastern North Carolina **Ex. 6 - Personal Privacy**.

Ex. 6 - Personal Privacy**Ex. 6 - Personal Privacy****Ex. 6 - Personal Privacy****Ex. 6 - Personal Privacy**

health of the Lower Neuse. The Lower Neuse extends from a line at Goldsborough, North Carolina, downstream to the mouth of the river. At the same time,

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

12. The Waterkeeper Alliance is a nonprofit organization that unites more than 200 Waterkeeper organizations in North Carolina, across the United States, and around the world, focusing citizen action on issues that affect our waterways, from pollution to climate change. Waterkeeper Alliance's Pure Farms, Pure Waters Campaign recognizes that CAFOs and the rise of corporate controlled meat production have nearly destroyed the family farm and severely poisoned our nation's water resources. It is my understanding that the industry, including feed production, is the leading cause of nutrient and pathogen impairment of rivers and lakes across the United States.

Ex. 6 - Personal Privacy

in North Carolina in their efforts to address the impacts of CAFOs, which are a major source of pollution to the waters and the environment of the state.

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

only affect the waters and the environment of the state, generally, but they have a disproportionate impact on the health and quality of life of African American, Hispanic and low income communities in North Carolina and are an issue of environmental justice in the state. Working on issues related to CAFOs opened my eyes to environmental justice issues.

1

Impacts of Swine Waste

15. **Ex. 6 - Personal Privacy** I became aware of the impacts of swine farms immediately.

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy I had been dealing with swine CAFOs for a long time. It quickly became evident that CAFOs were one of, if not the largest contributors of nutrients to the Neuse River. This remains true to this day.

16. In the beginning the issue was primarily environmental, and, in particular, the impact on water quality throughout swine country.

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watersheds where CAFOs were also having an impact. High concentrations of nutrients and bacteria from swine waste were leaving the facilities as runoff and getting into waterways. In many cases, I saw the runoff coming off the fields through ditches and into waterways. Through testing and monitoring we saw that this runoff was having an impact through high levels of nutrient and bacteria—in particular, fecal coliform, nitrogen, phosphorus and ammonia.

Ex. 6 - Personal Privacy

might be a problem. Concerns were raised because someone reported runoff or spraying right into a ditch, because excessive spraying or other problems were observed on flyovers, or for some other reason. Three photographs that I took of examples of runoff from hog facilities on January 2012, in Duplin County, March 2013 in Duplin County, and March 2013 in Greene County are attached as Exhibits 2, 3, and 4, respectively.

18. **Ex. 6 - Personal Privacy** follow the Standard Surface Water Sampling Protocol established by the United States Environmental Protection Agency (EPA). This includes the use of personal protective gear (gloves and boots), which is a standard practice and is a requirement to protect the integrity of the sample or samples, as well as to protect the individual sampler from coming in contact with potentially harmful constituents in the sample. Samples are properly labeled to ensure accurate documentation.

19. The Protocol also focuses on acquiring samples in ways that ensure that the samples are not cross contaminated, and in appropriate circumstances, the sampler acquires the sample from the downstream position of the sample site. Once acquired, the samples are preserved by being placed into an ice cooler with ice for transport to a North Carolina state certified laboratory. Chain of Custody forms, as required by the state certified laboratories, are properly maintained during the transport of the samples.

20. When sampling water, **Ex. 6 - Personal Privacy** wear personal protective gear both to prevent contamination of the samples and to protect **Ex. 6 - Personal Privacy** from exposure. **Ex. 6 - Personal Privacy**

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21. The odor from swine CAFOs can be very strong. I have experienced the odor from my car, during monitoring activities, and more generally when I am traveling around the area.

22. When exposed to odor from swine CAFOs, my colds last longer and I have had **Ex. 6 - Personal Privacy** that seemed to last a long time. Exposure to air pollution from CAFOs has exacerbated health problems from what is normal for me.

23. **Ex. 6 - Personal Privacy** which are opportunities to go up in a plane to observe the facilities from above and to take aerial photographs throughout the state. On these flights, I have seen waste sprayed directly over a ditch, liquid waste from a sprayer leaving a property as a result of wind drift, and spraying into a wetland or creek. In at least one case, I have seen gullies that developed on the sprayfield, which lead to the waterway, in this case Stocking Head Creek. The erosion of

the sprayfield creates a direct conveyance of waste off of the property. I have attached three photographs of such gullies taken in August 2013 in Beaufort County, August 2013 in Beaufort County, and February 2014 in Duplin County as Exhibits 5, 6, and 7, respectively.

24. On flyovers, I have also seen the burial of dead animals and issues dealing with lagoon levels.

25. Some of the areas in eastern North Carolina with the heaviest concentration of swine CAFOs—for example, in Duplin County, also have a high concentration of poultry facilities. With the completion of a new chicken slaughterhouse in Kinston, NC that reached full production in January, 2013, the number of poultry facilities increased dramatically and were concentrated in a roughly 50 mile radius of the new slaughterhouse. During flyovers, I have also seen piles of poultry waste that are put in the field and, also, the applications of poultry waste on fields.

26. In Duplin and surrounding counties, the co-mingling of facilities—hogs, poultry and also cattle grazing on the same properties—adds to the level of concern about the concentration of nutrients from waste.

27. The spread of disease is also a concern, with infections spreading from one species to the next—avian flu translating into swine flu, for example. Concerns about the spread of disease are heightened because of the methods used by swine CAFOs for disposing of mortalities. Porcine Epidemic Diarrhea virus (PEDv) has been impacting North Carolina since approximately June 2013 and continues to decimate swine herds. Impacting the piglets, to my knowledge PEDv still has no known effective antibiotic that is even slowing down the impact of this disease. Although actual figures are not available, with as many as 3 million piglets that have died in the state, this virus adds to the need to dispose of dead animals, which in this case is done by burying carcasses, further raising concerns about contamination of surface and ground water.

28. There's a certain percentage of mortality in all CAFOs. When the animals die, the CAFO operators need to do something with the bodies. There are four methods of carcass disposal in Eastern North Carolina. First, burial, which involves digging a hole

in the ground on the property and covering it up. The second is incineration whereby operators have a furnace on the property where the dead animals are burned. The third method is composting. Dead animals are mixed in with other products and allowed to decompose. The compost may then be used for fertilizer. Composting is not in widespread use as a method of disposing of swine mortalities here.

29. Finally, many facilities collect mortalities and put them in a dumpster, which is known as a "dead box." These dead boxes are usually at the end of the driveway leading to the facility. Trucks then pick up the dead bodies for rendering at a rendering plant, where the animals are used for parts that have commercial value.

30. I have a number of concerns about the disposal of mortalities in dead boxes. Often, the bodies are exposed to the elements, and the animals are exposed to predators such as buzzards or animals on the ground. Dead boxes have covers but I have seen dead boxes where the cover is not being used many times. Second, there is the issue of flies and odor. Third, these dumpsters leak liquid, either because of precipitation or from liquid from the animals themselves. Sometimes dead boxes sit in the sun for days. I have a concern that fluid from the boxes can get into the surface water or groundwater and, through runoff, go into nearby creeks and streams. I have attached two photos of dead boxes taken in February 2014 in Craven County and Jones County as Exhibits 8 and 9 respectively.

31. The trucks carrying mortalities to the rendering plant also leak. There is a rendering plant run by Valley Proteins, Inc., in Rose Hill, Duplin County.

32. I am also concerned about the impacts of the disposal of mortalities through burial, both improper burials and, also, burial that is technically in compliance with state rules but can contaminate ground water. This concern has been heightened by the recent spread in North Carolina of porcine epidemic diarrhea (PED). Swine CAFOs in Eastern North Carolina are located on low lying coastal plain with sandy soil, often at or near the flood plain and in proximity to wetlands. We have observed little regulation or oversight of how close burials are to state waters, the depth of the burial site, or how long the animals are left uncovered. The water table in this area of the state is high and

there isn't much distance before a pit reaches groundwater. I have seen hogs buried in holes that are filled with ground water. Two photographs that I took of buried hogs are attached as Exhibits 10, 11.

33. With more than 2,000 swine facilities in Eastern North Carolina, the impact on the water is significant.

34. At swine CAFOs, as the animals defecate, the waste either falls through slats in the floor or are scraped off into a "lagoon" which is an open cesspool of feces and urine. The lagoons start to fill up. To my knowledge, only 14 lagoons in North Carolina have a man made liner. The rest of them are primarily clay. These lagoons are sources of leaking into groundwater. The majority of the lagoons in Eastern North Carolina are more than 15 years old and susceptible to cracks, which increase leakage.

35. Once the waste has separated and the solid waste has settled in the lagoons, the process is to pump the liquid waste through a hose and land applicator through several different types of sprayers in the general area of the facility. Some portion of the liquid is channeled by drain tiles and ditches and ultimately makes its way to waters of the state.

36. The sprayers atomize the particles, which are airborne and capable of being transported for miles, depending on wind conditions. I have smelled swine manure on streets, passing by in my car, and have felt the mist coming on to my vehicle and on my skin.

37. The proximity of sprayfields to people's homes impacts water and air quality, and it also adversely affects the quality of life for neighbors, who are no longer able to sit on their back porch with a glass of sweet tea and enjoy their own property. The smell of hog feces and urine drives them back inside. People also experience the stress of being in an area where there is so much impact from a neighboring facility, which can divide the community. In some cases, part of community is connected to hog raising as operators or employees, and another part is feeling the impacts and is opposed to it.

38. Swine are also moved at different stages of life. Most of the growers in North Carolina contract with an integrator. The integrator owns the animals and contracts with a grower for services during a set period—for example, a facility might be farrow to wean or wean to finish. They are generally moved between facilities or to the slaughterhouse in open tractor trailers. I have seen these trucks traveling through small communities, and put on the open road. The hogs defecate in the trucks, which then leak hog waste, particularly if it is raining. In addition, the transportation of hogs in open trucks creates a risk for the spread of disease. This is another layer of impact to the nearby communities.

39. **Ex. 6 - Personal Privacy** water monitoring on Stocking Head Creek, on a 3½ mile stretch of water with more than 30 CAFOs, as well as grazing cattle affecting the creek. The creek originates in the middle of a sprayfield. **Ex. 6 - Personal Privacy** creek for a number of years and water testing reveals high levels of contaminants. CAFOs are the major contributors to contamination on this Creek. To my knowledge, there is one other source upstream—a septic tank pumping business, which has an area where human waste is applied. I have attached five monitoring reports from water testing in Duplin County, which show high bacterial and nutrient levels that are consistent with contamination from swine waste into waters. See Exhibits 12, 13, 14, 15 and 16. I have also attached “Stocking Head Creek Fecal Coliform Bacteria Investigation,” a report submitted to Waterkeeper Alliance on January 18, 2014 by Michael A. Mallen, Ph.D., Center for Marine Sciences, University of North Carolina Wilmington as Exhibit 17.

40. The areas with high concentrations of swine CAFOs, such as portions of Duplin County, are disproportionately communities of color and low income communities and, historically and today, have lacked political and financial clout. This is one of the biggest concerns related to the impacts of the swine industry in Eastern North Carolina—local communities don’t have enough clout to influence what they are exposed to, and it is also more difficult for these communities to get the political

accountability required to ensure attention from state officials charged with setting and enforcing permit conditions.

7

Inadequate Protection From Harm

41. The risks and harms associated with swine CAFOs are widespread, and from the perspective of both the impact on water and the impact on community members, more generally, these harms are exacerbated by the co-mingling of swine, poultry and cattle.

42. **Ex. 6 - Personal Privacy** I've seen manure spraying into ditches, gullies on sprayfields conveying waste to waterbodies, spraying during inclement weather, wind blowing manure mist onto neighboring properties, strong odors, leaking dead boxes, hogs buried in holes filled with water, and many other practices that adversely affect water quality, air quality, health and the quality of life. Enforcement mechanisms available under state and federal environmental law are inadequate to protect individuals, the impacted communities, and the waterways from harm.

43. North Carolina's Department of Environment and Natural Resources (DENR) has known about the adverse impact of swine CAFOs on communities in Eastern North Carolina for years, at least since I became the Lower Neuse Riverkeeper. I have raised these issues as to specific problems on particular facilities and more generally.

44. Over the years, numerous issues/formal complaints have been provided to state agencies (NCDENR, DWR, Dept. of Agriculture) which, and others working with me, have documented from pur ground and aerial monitoring. These include alleged illegal application of waste, discharges into water bodies, improper burial of dead swine carcasses, improper location of burial pits, issues with Dead Boxes and the long term storage of dead swine carcasses. I have also been involved with situations where Notice of Intent (NOI) documents have been filed as a result of sampling results acquired from a specific swine facility.

45. The avenues available to address violations of the law in North Carolina are not effective mechanisms for ensuring that swine CAFOs don't have an affect on

water quality, air quality, property value, quality of life, or other adverse impacts. Riverkeepers and community members can use the legal process and bring actions to enforce the Clean Water Act, which we have done and will continue to do. Waterkeeper Alliance has initiated a number of Clean Water enforcement actions in the last few years. But Clean Water Act citizen suits are expensive and time consuming, and there are significant procedural obstacles to bringing a case. The availability of legal avenues does not prevent adverse impacts on communities.

46. If there are issues of imminent concern where there has been a clear violation of a rule, like dead boxes being exposed for a couple of days or a sprayer being sprayed into a water body, then I have contacted the appropriate state agency—for example, the DENR or the Division of Water Resources (DWR)¹¹ and asked them to respond. On occasion, for example, where we report that we see waste flowing directly in a water body, they have responded in a timely way. With budget cuts at DENR, there is additional reason to be concerned that inspections and responses may not be as timely in the future.

47. Even with imminent problems, DENR doesn't respond if the report is made on a weekend or after hours (5:00 PM). In general, on occasion when issues have been witnessed in late day or on weekend when the DENR (DWR) offices are not open, the time frame for response can be several days, thereby allowing for the alleged issue to have passed with no opportunity for investigation by the state agencies.

48. Even in the past, DENR has not addressed the problem, and there is a lack of appropriate enforcement. This would include specific complaints in reference to illegal spraying of swine waste onto a public road and/or into a public right of way ditch along a public road, spraying during a precipitation event and/or over saturation of a spray field. In the case of reported alleged illegal burial of dead swine carcasses, the enforcement action by DENR (DWR) was a simple Notice of Warning.

49. The sampling we've done demonstrates that the impacts of swine CAFOs on water are not limited to a handful of bad actors or a few incidents. We see ongoing high levels of nutrients and bacteria at multiple sites.

50. With more than 2,000 facilities, there are also accidents, which also have an impact. Facilities might turn the wrong valve or otherwise make mistakes that lead to overspreading of waste or other problems.

51. Even if waste management plans at swine CAFOs are followed, these plans don't guarantee that there won't be pollution or impacts on communities, because of the inherent nature of the process. Lagoons lined with farmer clay leak. Open cesspools of feces and urine have odor. Spraying liquid waste to an open field has odor. Particles sprayed from sprayers drift in the wind, taking with it the potential for the spread of bacteria and other contaminants. Ditches and tiles channel waste to waterways. Weather can be unpredictable and weather influences how waste is conveyed off the property. The lagoon and sprayfield system is not a closed system, such as you might find in a wastewater treatment plant, and it is difficult to control all of the variables. Current permit conditions are inadequate to prevent harm and to protect the health of people living, working, and going to school in proximity to swine facilities.

I declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief.

Executed in

Ex. 6 - Personal Privacy

North Carolina on August 27, 2014

Ex. 6 - Personal Privacy

Exhibit 1

Education

Ex. 6 - Personal Privacy

Related Career Experience

Ex. 6 - Personal Privacy

Ex. 6 - Personal Privacy

Additional Experience

Ex. 6 - Personal Privacy

Research Experience

Ex. 6 - Personal Privacy

Exhibit 2



Exhibit 3



Exhibit 4



Exhibit 5



Exhibit 6



Exhibit 7



Exhibit 8



Exhibit 9



Exhibit 10



Exhibit 11

